



Horizon 2020
Programme

GRE@T-PIONEER

Coordination and Support Action (CSA)

This project has received funding from the European
Union's Horizon 2020 research and innovation programme
under grant agreement No 890675

Start date : 2020-11-01 Duration : 36 Months



Operative structure

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GRE@T-PIONEER - Contract Number: 890675

Project officer: Ptackova Katerina

Document title	Operative structure
Author(s)	Pr. Christophe DEMAZIERE
Number of pages	63
Document type	Deliverable
Work Package	WP1
Document number	D1.2
Issued by	Chalmers
Date of completion	2021-12-07 11:48:04
Dissemination level	Confidential, only for members of the consortium (including the Commission Services).

Summary

This document presents the various guidelines and procedures to be followed by the GRE@T-PIONEER consortium for the development of the various teaching resources and their deployment. After presenting the overall pedagogical set-up of the project, the e-learning resources available to the consortium are detailed. Thereafter, course design principles are highlighted and guidelines for the development of course materials are given.

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History

Date	Version	Submitted by	Reviewed by	Comments
November 4 th , 2021	1.0	C. Demazière (CHALMERS)		
December 3 rd , 2021	1.1	C. Demazière (CHALMERS)		Revision after the workshop held on November 19 th , 2021 in Brussels Small adjustments of the text







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Abbreviations and Acronyms

Acronym	Description
AB	Advisory Board
ALC	Active Learning Classroom
CA	Consortium Agreement
CAMP	Code Application and Maintenance Program
EUG	End-User's Group
ExCom	Executive Committee
GA	Grant Agreement
GDPR	General Data Protection Regulation
IP	Intellectual Property
JITT	Just-in-Time Teaching
LMS	Learning Management System
NDA	Non-Disclosure Agreement
NRC	Nuclear Regulatory Commission (US)
OECD/NEA	Organization for Economic Cooperation and Development/Nuclear Energy Agency
QA	Quality Assurance
ROM	Reduced-Order Model
SOUL	Smart Open Universe of Learning
SSP	Studsvik Scandpower
TL	Task Leader
WPL	Work Package Leader





Executive Summary

This document presents the various guidelines and procedures to be followed by the GRE@T-PIONEER consortium for the development of the various teaching resources and their deployment. After presenting the overall pedagogical set-up of the project, the e-learning resources available to the consortium are detailed. Thereafter, course design principles are highlighted and guidelines for the development of course materials are given.

Keywords

Active learning, blended learning, flipped classroom, hybrid teaching





1. Introduction

The EU-funded GRE@T-PIONEER project aims at developing a specialized education in reactor physics and nuclear reactor safety for PhD and postdoc students, for nuclear engineers, and taken as advanced courses for MSc students. The education encompasses both theory and hands-on training exercises, the latter heavily relying on the use of research/training reactors and of computer-based modelling environments. The aim is for the students to be able to perform nuclear reactor safety simulations understanding all the approximations on which such simulations rely. This is considered essential knowledge in the education of highly skilled nuclear safety analysts. The use of pre-recorded lectures and electronic teaching resources allows students to learn at their own pace and get prepared for the hands-on training sessions. Those sessions, offered both on-site and remotely, use active learning methods under the close supervision and support of the teachers, thus promoting student learning.

2. Common pedagogical guidelines

2.1. Introduction

With the advent of cheap computing power, modelling and simulations represent an increasingly important part of a nuclear engineer's work. These tools rely on sophisticated models, databases, and algorithms, which the engineer needs to understand, so that the tools are used most efficiently and in relevant applications. Although reactor physics has always been a core discipline in nuclear engineering, computational reactor physics is often taught via advanced courses with fewer students. Due to the decrease of student enrolment in nuclear engineering programs in Europe, maintaining those courses has become increasingly difficult. In response to the closing of such specialised courses, the GRE@T-PIONEER was launched. The project aims at developing and providing specialised and advanced courses in computational and experimental reactor physics at the graduate level (MSc and PhD levels) and post-graduate level, as well as to the staff members working in the nuclear industry. Beyond the technical contents of the courses being developed, the novelty of the project lies with the use of innovative pedagogical methods aimed at promoting student learning. In order to maximise the time students spend with the teachers, flipped classes are offered. The self-paced learning elements rely on handbooks specifically written for the various courses, short videos summarising the key concepts, and online quizzes allowing one to test their understanding of those concepts. These elements need to be taken before attending interactive sessions organised under the close supervision of the teachers. The interactive sessions are based on active learning, during which the students have to implement and use the techniques they learned in hands-on training exercises designed to promote learning. The exercises are computer-based modelling assignments (either implementing algorithms and techniques from scratch or using already existing nuclear simulation tools) and hands-on training sessions on research reactors. In addition to the flipped classroom pedagogy, most of the interactive sessions are offered in a hybrid format: the students can decide to attend the interactive sessions either on-site or online. The





sessions are also given in a condensed format. Combined with the hybrid set-up, the courses are very well suited for lifelong learning.

In the following of this Section, the overall pedagogical concept and principles followed by the consortium during the implementation of the project are described in more details.

2.2. Active learning as the core strategy

The pedagogical approach followed by the consortium essentially relies on the concept of *active learning*, according to which students learn much more efficiently when they participate to engaging activities in the classroom with the support from the teachers (Freeman et al., 2014).

Learning can be considered as a process, which the students need to go through. One paradigm often used to define the various learning steps is Bloom’s revised taxonomy of the cognitive domain (Andersson et al., 200). This process, illustrated in Figure 1, is defined as a sequence of various skills, starting from lower-order thinking skills to higher-order thinking skills. In the lower order thinking skills, students try to remember and understand the course concepts they were presented. In the higher order thinking skills, students try to utilize such concepts on their own. Those skills include applying, analysing, evaluating the course concepts and creating. What the various skills represent and contain is more precisely exemplified in Figure 1.

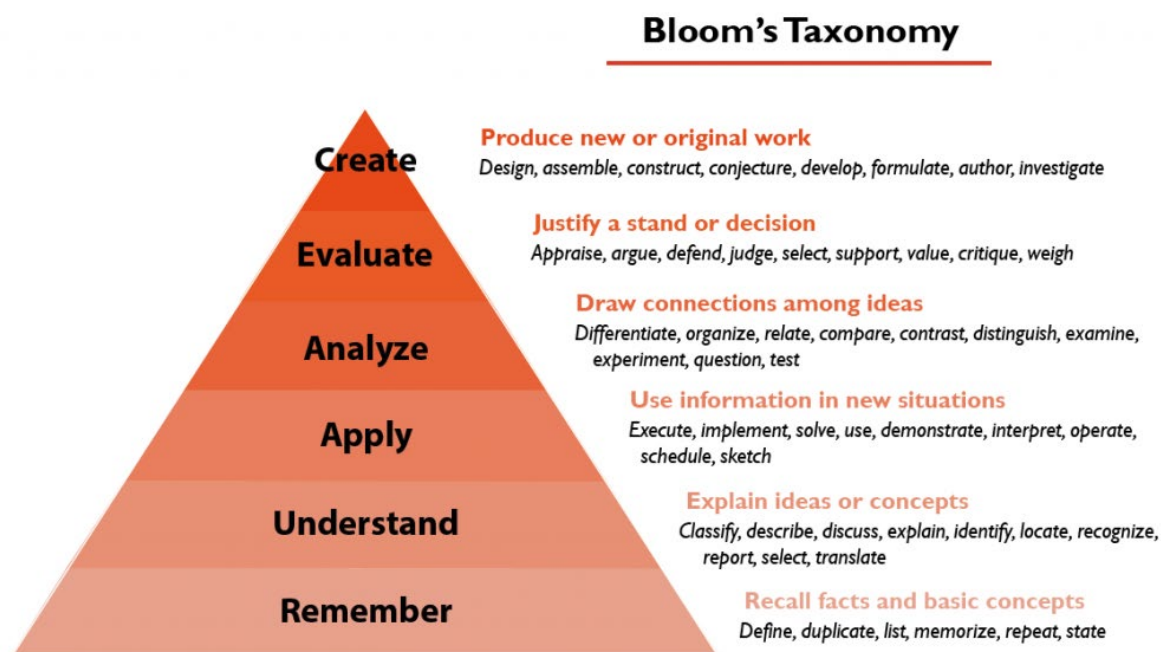


Figure 1. Illustration of Bloom’s revised taxonomy for the cognitive domain, with higher order thinking skills at the top of the diagram – adapted from (The Vanderbilt University Center for Teaching, 2021).

Teachers should strive to reach in their teaching set-up as high as possible thinking skills among students. Higher order thinking skills are triggered when students are given the possibility to utilize the





concepts they were introduced to. This requires from the teachers designing some engaging activities in which the students are actively involved, during which active learning takes place. The main incentive is the fact that one learns much better by doing and experiencing oneself, a principle called in everyday's jargon "learning by doing". Practice is the essence in reaching higher order thinking skills in Bloom's revised taxonomy.

Many definitions of active learning exist. The one generally accepted is given by Felder and Brent (2014) as follows: "Active learning is anything course-related that students in a class session are called on to do other than simply watching and listening to a lecture and taking notes." The backbone of active learning is to put student learning as the primary focus of the pedagogical approach used. A student-centered approach is thus required.

A large part of the efforts of the consortium is thus spent on designing active learning elements that are suitable to the topics being covered and to the set-up of the courses and project. The structure and formats of the activities can often be categorised as follows (Felder and Brent, 2016):

- *Individual activities*. Each student is asked to carry out the required activity on their own in a given time-period, after which a wrap-up is organised by the teacher. During this wrap-up, the teachers might ask some students to share the results of their activity with the class.
- *Small group activities*. Small groups of students are formed, and they are asked to carry out the required activity collectively in a given time period. Depending on the size of the groups, extrovert students might nevertheless be the ones driving the activity, at the expense of the more introvert students. Like for individual activities, a wrap-up discussion is led by the teacher, where a few selected groups share their results.
- *Think-pair-share activities*. Each student is first asked to carry out the required activity on their own. Thereafter, students are paired. Each student then has to discuss the activity with his/her peer, before a wrap-up is organised by the teacher, possibly asking a few pairs to share their results. In this set-up, the students can learn from each other. Compared to small group activities, personal opinions emerge more easily, with less influence from possible imbalance between extrovert and introvert personalities.

Despite the advantages of using an active learning set-up in terms of student learning, there are also some pitfalls to be aware of:

- Designing interactive sessions promoting active learning is a far from easy task and teachers are not always well equipped for such a paradigm shift.
- Active learning requires the students to be engaged in the sessions and responsible for their learning. As students are mostly used to passively receive information, such a different pedagogical approach might be destabilizing for some students.

Some examples of active learning strategies are presented in the GRE@T-PIONEER deliverable D1.1 – Section 7.4 (Jaiyeola A. et al., 2021). Such strategies could be used as a source of inspiration for the active learning sessions organized as part of the GRE@T-PIONEER project, depending on the topics being covered.





2.3. Flipping to increase pedagogical support

In order to make room for such activities in a course curriculum, flipped classrooms are used, with the traditional delivery of lecture-based contents moved outside of the classroom: lecture and materials usually presented in class are instead made available to the students on the web and before class (Bishop and Verleger, 2013).

In the flipped classroom model, students learn asynchronously as they can choose when and at what pace to watch/read the course material. In contrast to the traditional teaching format, low order thinking skills are practiced during this asynchronous phase, before the students meet the teachers and other students for synchronous interactions. As a consequence, the time spent with the teachers can be used more effectively to engage students in high order thinking activities, clarify difficult concepts and provide individual support.

Since the students attend the synchronous sessions much better prepared than in a traditional teaching set-up, flipped classrooms were demonstrated to lead to much better learning outcomes and to contribute to a deeper learning compared to traditional teaching (Bishop and Verleger, 2013; O’Flaherty and Phillips, 2015). The key aspect of flipped classrooms is freeing time in the classroom in order to organise engaging activities with the students under the teacher’s supervision, thus favouring active learning.

Another advantage of the above teaching set-up with respect to synchronous versus asynchronous learning is the possibility for the teachers to gather data about student learning before they meet the students for synchronous interactions. As a result, and making use of a Just-in-Time-Teaching (JiTT) philosophy (Watkins and Mazur, 2010), the teachers are able to adjust their synchronous teaching sessions to the students’ needs. This further improves student learning.

Although variations exist between the various course modules developed as part of the GRE@T-PIONEER project, the overall methodology for the course development relies on different elements developed by the consortium:

- *Handbooks* covering the theoretical aspects of the covered topics.
- *Pre-recorded lectures (or webcasts)* available for on-demand viewing and extracting the main features, results, and concepts of the handbooks. The webcasts are recorded with the teacher’s voice and, when possible and relevant, video, while using on-screen annotations, thus making the webcasts vivid.
- *Online quizzes* associated with the webcasts, focusing on conceptual understanding, with immediate feedback to the students on their learning. The quizzes are designed in such a way that thinking skills beyond merely remembering concepts are triggered, including the applying, analysing, and evaluating concepts in Bloom’s revised taxonomy. Such active learning elements encourage a deep approach to learning. Moreover, embedding quizzes in the pre-recorded webcasts allows for splitting of the lectures (webcasts) into smaller chunks, increasing student attention and thus improving the conditions for learning. As an additional benefit, the quizzes allow the teachers to continuously monitor students’ comprehension of key concepts.





- The possibility to *pose questions* to the teachers while watching the lectures. When possible, students are offered to rate, on a voluntary basis, the pre-recorded lectures and to provide comments. Such comments, at the lecture level, provide meaningful information about student learning and can also be used to improve the design of the handbooks, videos, and quizzes.
- *Active learning sessions* in forms of wrap-up and tutorials with synchronous interactions between the students and the teachers. Various active learning methods are implemented depending on the topics, the set-up of the course module, and the course moment. Using JiTT, the synchronous sessions are designed to address the students' needs.
- Use of discussion fora monitored by the teachers. The fora are utilised as a post-class activity to maintain engagement, favour collaboration between students and are also used for providing additional feedback and help to the students.

The entire management of all electronic resources is done via a Learning Management System (LMS).

All the collected information – the answers to the quizzes, the questions sent to the teachers, the rating of the pre-recorded webcasts, as well as additional comments provided by the students – are used to prepare the synchronous sessions designed to meet the students' needs, building on the concept of JiTT. The sessions contain four key parts: 1) providing a brief summary of the key concepts and their relation to the structure of the chapter so that the students could relate the details to the overall picture, thus favouring a more holistic approach to learning; 2) answering the questions that the teachers received; 3) going through the quizzes in an interactive way and discussing different alternatives; and 4) going through specifically designed activities, exercises, tutorials or hands-on training. This last part of the synchronous sessions constitutes the most important part, both in terms of devoted time and impact on student learning. Using active learning techniques, students are more engaged and learn more efficiently. Moreover, this last part of the wrap-up sessions is where the degree of interaction between the students and teachers is highest. Thanks to the flipped nature of the courses, the activities address higher order thinking skills, during which teacher support is essential.

For each of the studied topics, the learning sequence for the students is made of several parts, as illustrated in Figure 2. The first ones include studying the handbooks, watching the webcasts, and completing the quizzes. Interactions with the teachers are only possible in an asynchronous fashion, using the communication channels of the LMS. Synchronous interactions become possible during the synchronous sessions, either in the classroom for the on-site attendees or via the web for the remote attendees. Various active learning techniques are used in such synchronous sessions, representing the course moments during which the students and the teachers interact the most. Finally, the students have to apply, analyse, and evaluate the studied concepts while solving post-class assignments, thus using high order thinking skills in Bloom's revised taxonomy. Discussion fora are also used for peer-instruction, with interventions from the teachers when necessary.



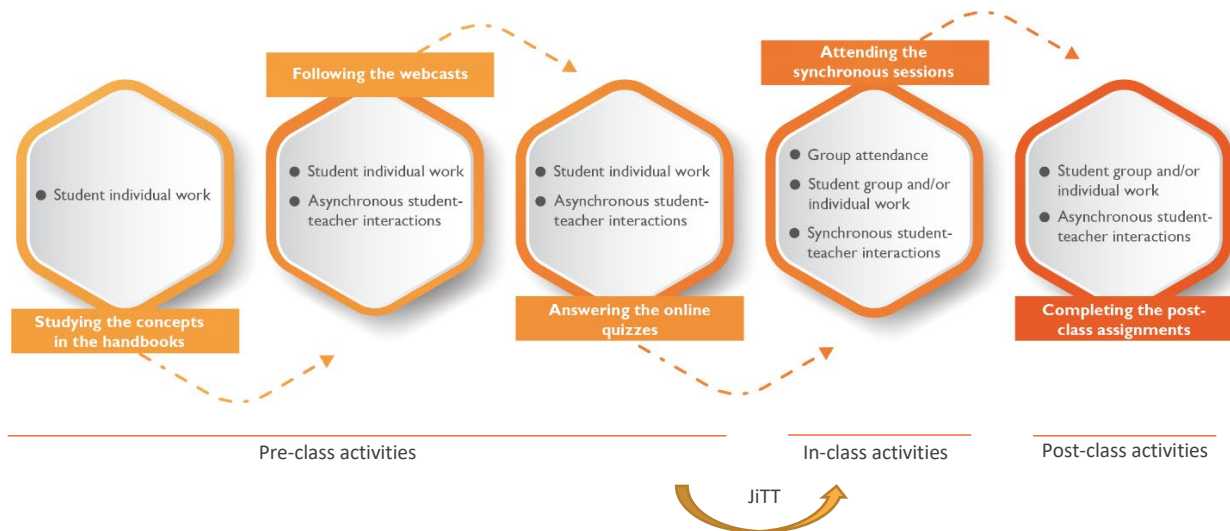


Figure 2. Illustration of the learning sequence.

2.4. Hybrid teaching to optimize attendance

Moreover, in GRE@T-PIONEER, the flipped classrooms are offered in a hybrid learning environment: students can decide to travel to the host organisation for following the synchronous sessions, or they can follow such sessions remotely on the web. The synchronous sessions are organised in specifically designed interactive teaching rooms: one available at Chalmers University of Technology (Demazière et al., 2017) and one at Universitat Politècnica de València. Such rooms are furnished with movable chairs, tables, and whiteboards enabling the use of a more student-centred pedagogical approach. This is of significance when a flipped classroom model is implemented, so that the in-class activities can focus on higher order thinking skills. In addition, the rooms are equipped with audio and video hardware and software that allow synchronous interactions between the on-site and off-site participants in form of digital content sharing, audio interactions, and video communication.

Such teaching rooms allow for courses to be offered to remote students in a pure virtual learning environment without any need to travel. The rooms make offering the synchronous sessions to both the on-site and off-site attendees possible. Furthermore, the two audiences can interact with each other.

2.5. Digital technologies to promote learning

The consortium heavily relies on the use of digital resources and tools, with the objective of promoting learning. In this respect, several aspects are taken into consideration (Felder and Brent, 2016):

- *Making a variety of learning resources available.* The goal of providing a variety of resources is to improve learning.





- *Facilitating active student engagement.* Digital tools promoting more engagement, both in in-class activities and out-of-class activities, are used, such as quizzes, computer-assisted demonstrations or exercises or interactive multimedia tutorials (on which the students could also train at their own pace as out-of-class activity).
- *Enhancing student-faculty and student-student interactions.* Digital tools increasing the availability of the teachers to answer student questions or issues outside of the planned in-class sessions are used. Such tools also allow students to more easily communicate with each other outside of the in-class session times or ordinary working hours.
- *Providing formative and summative feedback to the students.* In addition to providing feedback to the students when they complete given tasks used for grading them (summative feedback/assessment), a much better way to influence student learning and motivate them is to continuously provide feedback to them while they learn (formative feedback).
- *Providing adaptive, individualized, self-paced instruction.* Since students learn differently, the pace at which they can process some new materials might vary significantly from one student to the other. By providing flexible teaching materials that the students could consult e.g., at home at their own pace, learning can be more efficient. Such flexible learning approaches are also very well suited to students with cognitive disorders, such as dyslexia or autism.

Some examples of and advice for using digital technology in engineering education are presented in the GRE@T-PIONEER deliverable D1.1 – Section 7.5 (Jaiyeola et al., 2021). They could be used as a source of inspiration for the implementation of the GRE@T-PIONEER project.

3. E-learning resources available to the consortium

3.1. Introduction

As the consortium heavily relies on digital technologies, an inventory of the e-learning platforms and distant learning facilities accessible to each consortium partner was carried out in the period November 2020-June 2021 using a template identical for all partners. The inventory included all aspects allowing a proper execution of the project:

- Access to/availability of LMS.
- Access to/availability of recording studios.
- Access to/availability of screencasting software for recording of lectures.
- Access to/availability of on-line quizzes tools.
- Access to/availability of Active Learning Classrooms (ALC).

In addition, an inventory of the tools and facilities necessary to the practical implementation of the hands-on training exercises was also carried out:

- Access to/availability of nuclear-specific simulation software.





- Access to/availability of general-purpose coding software.
- Access to/availability of laboratory equipment/facilities.

Two web-based meetings were held with the consortium members: one on December 4th, 2020, and one on January 19th, 2021, during which the inventory made by each partner was presented and discussed. Minutes of the meetings were also prepared, together with a list of actions to be undertaken by some partners. The details of the inventory executed by each academic partner of the consortium is available in Appendix A whereas an overview of the inventory per class of resources is presented in Appendix B. In the following, the main conclusions per class of resources are given.

3.2. Learning Management System

Since the courses are offered outside of the regular education at each partner organisation, using the Learning Management System (LMS) of the respective organisation was found to be impossible. The main issue is whether access to the LMS can be easily granted to teachers and students external to one's organization, and how to create own course pages, if those courses are not part of the regular education. Several platforms and LMS were considered, with demos of the best platforms organized for the consortium. Thereafter, the different solutions and LMS were evaluated. The evaluation criteria used for the selection of the LMS were the following:

- The capabilities of the LMS and more specifically proctoring capabilities, quiz capabilities, e-commerce capabilities and learning analytics.
- The possible integration of external tools.
- The cost of the LMS, both during the time when the GRE@T-PIONEer project is running and after its completion.
- The system on which the LMS is based.
- The country hosting the data/LMS.
- The possibility to check the identity and nationality of the users of the LMS.
- Compliance with the General Data Protection Regulation (GDPR).
- Update and maintenance of the LMS after the first delivery.
- Training for the users of the LMS.
- Support for the use of the LMS.
- Quality Assurance certification of the LMS.

After a careful evaluation of the different solutions and LMS, the consortium decided to purchase an LMS on its own: SOUL (Smart Open Universe of Learning) from Tecnom. A training version of the LMS was made available to the consortium on November 18th, 2021. The costs of the LMS are covered by ENEN. The LMS is essentially based on Moodle. Advanced learning capabilities allowing a centralized analysis of all data available on the LMS were also purchased from Tecnom.





3.3. Recording studio

For the recording of teaser videos (videos aimed at explaining the course modules and attracting students), two recording studios are accessible to the consortium: the Studio Decibel at CHALMERS and one studio at UPV. Both studios are available to external partners. This nevertheless requires the other partners to travel to either CHALMERS or UPV for the recording of those videos. Some other recording studios might be available for some of the other partners. Nevertheless, the capabilities of those studios and/or the possibility to use them for courses not part of the ordinary education are still not clear at this point. In addition to the Studio Decibel, CHALMERS has also access to the Faraday ALC studio (which belongs to the University of Gothenburg). Although the conditions to use this studio are also rather fuzzy at this point, this studio is equipped with a transparent glass on which the lecturer can write during the recording. This feature might be most interesting for recording the technical lectures. Using those studios and the associated services requires the payment of fees, which were considered as reasonable/affordable.

3.4. Screencasts/webcasts

In addition to the recordings of teasers' videos in one of the two recording studios described above, the consortium will record a large number of more technical videos supplementing the handbooks. Such videos will be recorded by the course lecturers themselves using screen-recording/casting software, which allows one to record their computer screen, with audio and video of the lecturer. It was considered that all partners have access to the necessary resources in-house. Most partners gained a significant experience on those tools because of Covid-19. Many screencasting software are available either free of charge or for purchase, in case a partner needs to acquire a screencasting software. Moreover, most web-conferencing tools offer the possibility to make screen recording, although the capabilities for post-editing are almost non-existent. Three pieces of software were mentioned by the partners as very good tools: Camtasia (recording only), OBS Studio (recording and live streaming) and Big Blue Button (recording and live streaming).

3.5. Quizzes

The on-line quizzes are directly available within the LMS, thus offering a seamless integration. Thanks to the learning analytics capabilities of SOUL, analysing student learning, both collectively and individually will be possible. Since SOUL is based on Moodle, the different types of standard quiz questions that are available in Moodle version 3.11 are:

- Calculated questions (more information at this [link](#)).
- Calculated multi-choice questions (more information at this [link](#)).
- Simple calculated questions (more information at this [link](#)).
- Drag and drop into text questions (more information at this [link](#)).





- Drag and drop markers questions (more information at this [link](#)).
- Drag and drop onto image questions (more information at this [link](#)).
- Essay questions (more information at this [link](#)).
- Matching questions (more information at this [link](#)).
- Embedded answers/questions (more information at this [link](#)).
- Multiple choice questions (more information at this [link](#)).
- Short answers/questions (more information at this [link](#)).
- Numerical answers/questions (more information at this [link](#)).
- Random short-answer matching questions (more information at this [link](#)).
- Select missing words questions (more information at this [link](#)).
- True/false questions (more information at this [link](#)).

Some additional question types are also available as add-ons (more information at this [link](#)).

3.6. Active Learning Classroom

For the Active Learning Classrooms (ALC) that can offer hybrid attendance (on-site and off-site), two possibilities are readily available: at CHALMERS and at UPV. The number of on-site participants in both cases is rather limited (25 persons in CHALMERS and at UPV – the ideal number being 15 persons at CHALMERS). Some other possibilities at some other consortium partners might become available during the project. Beside moveable furniture for implementing active learning, both rooms are equipped with hardware and software allowing sharing contents both to the on-site and off-site attendees: screensharing, audio sharing (via dedicated mics and loudspeakers) and video sharing (via dedicated webcams). More information about the CHALMERS room is available in (Demazière et al., 2017). Both rooms are further described in Appendices A and B.

3.7. Nuclear-specific simulation software

Some of the hands-on exercises rely on the use of nuclear-specific simulation software. The following software are planned to be used:

- Free and openly available software: ENDF, NJOY, PREPRO, JANIS, DICE, NDAST, SPNDYN, OpenMC.
- Free but not openly available software: Serpent.
- Not free and not openly available software: PARCS, SNAP, TRACE, RELAP5 and TRACE – fee covered via the Code Application and Maintenance Program (CAMP), and CASMO/SIMULATE (fee to be paid by the partners using the codes).

Due to the variety of codes as listed above, it was decided to let each partner address issues associated to their respective use of the above codes in the specific set-up of the GRE@T-PIONEER project, such as:





- Whether a software can be used by persons external to the partner organization offering the course module. Those persons would not be registered as part of the regular education offered by the partner organization.
- Whether external persons attending the course module remotely can use the software.
- Whether there are some restrictions about the nationality of the persons who could use the software.

It is worth mentioning that a site license does not systematically allow to make the code accessible to off-site students and/or students not part of the regular education.

Concerning the CAMP software, Non-Disclosure Agreements (NDA) with the US Nuclear Regulatory Commission (NRC) need to be signed by each user of the codes. Participants not citizen of a CAMP country would generally not be approved. This point will be further investigated with the NRC.

Concerning Serpent, the consortium was in contact with the developers of the code, in order to investigate the feasibility of using the code for GRE@T-PIONEER. Two main issues needed to be addressed:

- Whether the Serpent license covers the use of Serpent by participants to courses not part of the regular education at the GRE@T-PIONEER partners.
- If the answer to the above question was yes, whether Serpent can also be used by participants following the courses remotely?

The code developers stated that: “The current license is single-site type, but there are no clear guidelines on how to apply this in practice. Our interpretation for universities is that the license covers the students, but not external persons.” Nevertheless, when asking the code developers about the definition of “students” and more precisely the conditions to be fulfilled so that a participant can be considered as a “student”, the following answer was obtained: “We don’t have any detailed instructions on how the license terms and conditions should be applied. The Serpent licenses are single-site type, which we have previously interpreted to mean that the code can be used by employees and students of the organization. But in the end it is the licensee organization that is responsible.” It is thus the responsibility of each organization to interpret the Serpent license and to fulfil the corresponding conditions accordingly. An issue the GRE@T-PIONEER organizations planning to use Serpent would need to clarify with their respective legal counsellors is what defines a “student”, i.e., what the conditions to be fulfilled are so that a participant to a GRE@T-PIONEER course can be considered as a “student” by the concerned organization.

Finally, a new licensing system at the Organization for Economic Cooperation and Development/Nuclear Energy Agency (OECD/NEA), from which Serpent is available, was adopted on November 1st, 2020, having some implications on the use of Serpent and the other codes distributed by the OECD/NEA:

- Before November 1st, 2020, Serpent was distributed with a site license for the licensee organization. Such code distributions can still be used with a site license, even after November 1st, 2020.
- Since November 1st, 2020, Serpent is distributed with a single-user license. Any code request since November 1st, 2020, is personal and should be requested by any prospective user.





EPFL mentioned that in case of issues for making some of the codes accessible to the students, GeN-Foam could be used, since the tool was developed in-house and is available via a GNU GPL v3 license.

Finally, a discussion is on-going between CHALMERS and Studsvik Scandpower (SSP) to make some of the SSP tools remotely available (via a fee to be paid during the time the tools are made accessible). Such a solution could be used by some of the other GRE@T-PIONEER partners if they are interested.

3.8. General purpose coding software

In addition to nuclear-specific simulation software, some of the hands-on exercises are planned to be on implementing the methods and algorithms presented in the handbooks from scratch in general purpose coding software. In general, the use of general-purpose software may lead to the same issues as the ones mentioned in Section 3.7, most notably issues of access for students not formally enrolled at the partner organisation and of remote access.

Matlab Grader represents in this respect a viable option for coding assessment for the project: as the platform is web-based, the same environment can be offered to both the students following the hands-on exercises onsite and online. Furthermore, the platform can be used by any person invited to the platform by the teachers, as long as the teachers have an academic license. Since all the academic partners of GRE@T-PIONEER have a Matlab academic license, the use of Matlab Grader is thus possible and particularly interesting.

Several partners mentioned the possible use of Matlab:

- TUM and TUD. They nevertheless confirmed that their planned use of Matlab is mostly for post-processing of data. Although this could be done in Matlab Grader, a simpler solution would be to use, e.g., Python, which is freely and openly available. TUD also mentioned that they foresee the use of Matlab for Reduced Order Modelling (ROM), for which turning to Matlab Grader would be relevant.
- POLITO. POLITO confirmed that Matlab would be used to demonstrate some of the principles in the handbooks (whether the students might also need to use Matlab remains to be decided).
- CHALMERS. CHALMERS has already been using Matlab Grader for the past years, with very positive experience and feedback. Matlab Grader is planned to be used in GRE@T-PIONEER as well.

Moreover, Matlab Grader represents a viable path as it can be integrated in various LMS, and in particular Moodle-based LMS such as SOUL. Not having Matlab Grader integrated in the LMS would mean that the student data and their identities would be stored in the USA. With the LMS integration, only anonymized data are stored in the USA, thanks to the communication between the LMS and Matlab Grader, thus providing a GDPR-compliant option.

A so-called “Matlab license exception” at one of the partners is nevertheless required to allow the Matlab Grader integration in the LMS chosen by the consortium, in addition to the integration in the LMS used by the partners in their regular education. A dialogue between the MathWorks and CHALMERS resulted in a Matlab license exception being granted to CHALMERS, based on a proposal





from the Mathworks. This thus allows the direct integration of Matlab Grader into SOUL. This solution will not incur any additional cost to the partners and the MathWorks will directly help the consortium with the integration of Matlab Grader into SOUL.

3.9. Laboratory exercises

Concerning the laboratory exercises at the training reactors (CROCUS at EPFL, AKR-2 at TUD and the BME Training Reactor at BME), several meetings were held to define the exercises throughout the entire project and the conditions associated to the exercises.

The preferred period for the hands-on exercises was agreed upon as follows:

- March 2023 for TUD (with a backup time in August/September 2023 in case some exercises cannot be carried out as originally planned).
- End of May/beginning of June 2023 for EPFL (with a backup time backup in September 2023 in case some exercises cannot be carried out as originally planned).
- June 2023 for BME (with a backup time in August/September 2023 in case some exercises cannot be carried out as originally planned).

Each exercise period at the respective facilities will last between 1.5 and 2 weeks. It is not expected that the students will follow the exercises at all three facilities, even if they are welcome to do so.

Furthermore, each exercise period at each facility will cover all course packages offered by the GRE@T-PIONEER project, even if some students registered to only some of the course packages. Since some preparatory materials will be provided to each student participating to the labs, it is considered that the students will be able to carry out the laboratory exercises even if they did not follow the entire course module dedicated to those laboratory exercises.

Regarding the format of the exercises, they slightly differ between the three facilities:

- At TUD, each exercise will last between 3 hours to 1 day and will be offered onsite, with the possibility to share audio and video between the site and the remote participants (hybrid format). A maximum of 8 participants will be accepted onsite.
- At EPFL, each exercise will last for around 3 hours and will be offered onsite, with the possibility to share audio and video between the site and the remote participants, and in some cases to remote control the acquisition systems (hybrid format). A maximum of 6 participants will be accepted onsite.
- At BME, each exercise will last between 4 to 6 hours, with between 4 to 6 hours for measurement evaluations. The sessions will thus typically be split into morning and afternoon sessions accordingly. The exercises will be offered onsite, with the possibility to share audio and video between the site and the remote participants for the evaluation sessions only (hybrid format). For the measurement sessions, pre-recordings of those will be made available to the remote participants.





There is no restriction for accessing any of the facilities based on the citizenship of the participants. Furthermore, no issue of cybersecurity was identified, since there will not be any control of devices from outside any of the facilities (beyond the acquisition systems at EPFL).

4. Course design principles

4.1. Introduction

The principles for designing the various course modules are presented hereafter. Those principles should be perceived as recommendations. It is up to each teacher to decide on the practical implementation of the course modules. Moreover, due to the specificity of the different course moments, some variations compared to the principles below are inevitable.

4.2. Workshop on course design principles and implementation

A workshop restricted to the consortium members was organized in the afternoon of November 19th, 2021, right after the annual meeting of the consortium and the NESTet 2021 conference. In order to maximize attendance, the workshop was arranged as a hybrid event: the consortium members could attend the event either onsite or remotely. The onsite event was held in the same premises as the NESTet 2021 conference and the annual meeting (both events were also hybrid). The workshop had 10 onsite participants and 4 online participants.

The purpose of the workshop was to present and discuss with the consortium members the main course design principles to be followed, as well the practical implementation of the course modules. The main essence of the workshop is represented by the present report.

The agenda of the workshop was as follows:

- 13:15 – 13:30: Introduction and purpose of the workshop (C. Demazière, CHALMERS)
- 13:30 – 13:45: Overview of the adopted pedagogical approach (C. Demazière, CHALMERS)
- 13:45 – 14:30: Applying active learning techniques in hybrid learning environments (C. Stöhr, CHALMERS)
- 14:30 – 15:00: Coffee break
- 15:00 – 15:45: Training on the SOUL platform (Taliá Cardeñosa Fernandez, Tecnatom)
- 15:45 – 16:15: Overview of the e-learning resources available to the consortium (C. Demazière, CHALMERS)
- 16:15 – 16:45: Guidelines for the development of course materials (C. Demazière, CHALMERS)
- 16:45 – 17:00: Wrap-up and discussion (C. Demazière, CHALMERS)





As a training version of the SOUL platform was released to the consortium in November 2021, Tecnatom was also invited to the workshop and organized a training session for the consortium, so that the consortium members could feel more confident in using the platform. The workshop participants could use their own laptop during the workshop and practise on SOUL directly.

Beyond the presentation of the guidelines for the practical implementation of the course modules and the principles to be followed, the development of active learning strategies in hybrid learning environments was given special attention. Capitalizing on the NESTet 2021 conference and the stakeholder workshop organized by the consortium in the morning of November 18, 2021 – see deliverable D1.1 (Jaiyeola et al., 2021), Assoc. Prof. Christian Stöhr, specialized in Engineering Education Research at CHALMERS and member of the consortium, presented some possible active learning techniques that can be used in hybrid set-ups, as well as some advice on practical implementation.

4.3. Constructive alignment

The teaching and learning activities developed as part of the GRE@T-PIONEER project should be designed in such a way that those activities are aligned with the learning outcomes of the various course modules – a concept referred to as *constructive alignment* (Biggs and Tang, 2011). For that purpose, the intended learning outcomes of each course module should be specified, and the entire course module design adjusted accordingly. The entire learning sequence should be considered for that purpose. This also includes assessment and examination. Finally, the active learning techniques to be used during the synchronous sessions should be carefully chosen so that they support student learning and remained aligned with the learning objectives.

4.4. Quality Assurance procedures

The Quality Assurance (QA) for the development of the course modules is ensured via different levels of responsibilities given to various persons, depending on the course elements being developed:

- For the *handbooks*, the teachers developing those are the primary responsible persons. Since the handbooks are typically written by several teachers, the overall structure of the handbooks is first agreed upon by all those teachers, with clear responsibilities associated to each lecturer for writing each part of the handbooks. The handbook development process is monitored by the Task Leader (TL), as defined in the Grant Agreement (GA). The Work Package Leaders (WPLs) are then responsible for gathering information about the progress in the development of the handbooks and present it at the regular Executive Committee (ExCom) meetings, as settled in the Consortium Agreement (CA). Assembling the handbooks is the responsibility of the concerned Task Leader. The guidelines for developing the handbooks are given in Section 5.3.
- For the *teasers* (i.e., short videos of promotional/advertising nature), the process is driven by the Coordinator, with support from the TLs and WPLs. A video is produced for each course module, as well as a teaser for promoting the hands-on exercises on the research reactors. The





materials used in the videos (slides and possible prompter script) are first prepared by the lecturers involved in those videos. Feedback from the TL, WPLs and Coordinator are used to fine tune those materials. The actual recording of the videos is arranged by the Coordinator. The teaser development process is monitored by the TL, as defined in the GA. The WPLs are then responsible for gathering information about the progress in the development of the teasers and present it at the regular ExCom meetings, as settled in the CA. The guidelines for developing the teasers are given in Section 5.4.

- For the *webcasts* and *quizzes*, the same structure as the one of the handbooks is followed. The teachers responsible for given parts of the handbooks are also responsible for developing the corresponding webcasts and quizzes. The development process is monitored by the TL, as defined in the GA. The WPLs are then responsible for gathering information about the progress in the development of the webcasts and quizzes and present it at the regular ExCom meetings, as settled in the CA. The guidelines for developing the webcasts and quizzes are given in Sections 0 and 5.6, respectively.
- For the *hands-on* sessions other than the ones on the training reactors, the teachers developing those sessions are the primary responsible persons. Although tightly linked to the handbooks, the hands-on do not necessarily involve the same teachers. Within a given course module, the exact content of the hands-on should be first agreed upon by all the concerned teachers, with clear responsibilities associated to each teacher. The development process is monitored by the TL, as defined in the GA. The WPLs are then responsible for gathering information about the progress in the development of the hands-on and present it at the regular ExCom meetings, as settled in the CA. The guidelines for developing the hands-on are given in Section 5.7.
- For the *hands-on* sessions on the training reactors, the teachers developing those sessions are the primary responsible persons. Nevertheless, since those sessions are offered in a condensed format for all WP, the process is directly coordinated by the Coordinator, with support from the TLs and WPLs. The Coordinator is then responsible for gathering information about the progress in the development of the hands-on and present it at the regular ExCom meetings. The guidelines for developing those hands-on are also given in Section 5.7.
- For the *examination/assessment*, the teachers involved in the development of the corresponding handbooks, webcasts, quizzes and hands-on sessions are responsible for designing examination and assessment tasks. A common approach is followed per task, as defined in the GA. The process is driven by the TL, in concertation with the WPLs and the Coordinator. The WPLs are then responsible for gathering information about the progress in the development of the examination/assessment tasks and present it at the regular ExCom meetings, as settled in the CA. The guidelines for developing the examination/assessment tasks are given in Section 5.8.
- Some *feedback* on the course modules is gathered by different means. The LMS is directly used to gather student feedback on their learning experience, both while working on the various course elements and after completing a course module. Furthermore, the members of the Advisory Board (AB) and of the End-User's Group (EUG) of the consortium are consulted for gathering their respective inputs during the development of the teaching materials and possible course execution (in case an AB or EUG member participates to the teaching activities, either as course participant or course lecturer). The implementation of the possibilities to collect feedback is the responsibility of the Coordinator, with support from the concerned TLs and





WPLs. The Coordinator is also responsible for reporting on the development of the measures for collecting the feedback, as well as on the received feedback itself (when available), at the regular ExCom meetings. The guidelines for developing the means to collect feedback are given in Section 5.9.

Finally, the practical implementation of the various course elements on the LMS is the responsibility of the Coordinator, with support from the concerned teachers, Tls and WPLs. The Coordinator is responsible for providing a common layout across all course modules and for making the course elements available on the LMS. The Coordinator is also responsible for reporting on the development of the LMS to the regular ExCom meetings.

5. Guidelines for the development of course materials

5.1. Introduction

In the following, some guidelines for developing the various teaching resources are given. In total, there are six course modules to be offered as part of the GRE@T-PIONEER project. As described in the GA, those are:

- Nuclear data for energy and non-energy applications, together with hands-on training exercises.
- Neutron transport at the fuel cell and assembly levels, together with hands-on training exercises.
- Core modelling for core design, together with hands-on training exercises. This includes steady-state neutron transport at the core level, and core design and operation.
- Core modelling for transients, together with hands-on training exercises. This includes non-steady-state neutron transport at the core level, macroscopic modelling of nuclear thermal-hydraulics and fuel thermo-mechanics, and numerical methods for coupling.
- Reactor transients, nuclear safety and uncertainty and sensitivity analysis, together with hands-on training exercises.
- Radiation protection in nuclear environment, together with hands-on training exercises. This includes health physics principles and radiation protection regulations, and shielding and dose rate calculations.

The hands-on training exercises are mostly based on implementing some of the algorithms presented in the handbooks in general coding software, on using nuclear simulation software, and on participating to the training exercises organized at any of the three training reactors (AKR2-2 at TUD, CROCUS at EPFL, and BME Training Reactor at BME). The details of the hands-on training exercises are further described on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-file-30809>. This file is updated by the Coordinator for the entire project and contains the most up-to-date information about the hands-on exercises.





It should be mentioned that the hands-on exercises on the training reactors are organized as condensed sessions across all WP, i.e., when a student registers to a training session on a training reactor, he/she will attend all exercises at this facility.

Each course module follows the overall course set-up described in Figure 2. The post-class activities (i.e., studying the handbooks, watching the webcasts, and answering the quizzes) should represent about 40 hours of work for the students. The in-class activities should represent about 40 hours of work for the students. The post-class activities, if any, should be limited to less than 10 hours of work for the students. It should be noted that the hands-on exercises based on the use of the research reactors represent sessions offered for all course modules and are expected to last between 60 and 80 hours (i.e., 1.5 to 2 weeks of full-time studies), as described in Section 3.9.

5.2. Course modules description

For each of the course modules described above, the WPL are responsible for providing the necessary information for properly advertising the course modules, in concertation with the TL and the various teachers involved in the development of the respective course modules.

The WPL should use the template that can be found on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-file-31133>, complement the file, rename it WPx_course_description.docx (with x representing the number of the WP) and upload it on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11187>.

The information to be provided in the template is as follows:

- Name of the course module.
- Short summary of the theme covered by the course module (the WPL should provide a brief summary of the course theme and its relevance for computational/experimental reactor physics and nuclear reactor safety).
- Contents of the course module (the WPL should provide a detailed table of contents of the course module; this should include all aspects of the course module, i.e., the theoretical part and the hands-on exercises).
- E-mail address of the main contact person (most likely the WPL e-mail address).
- Learning objectives (what the students should be able to do after completing the course module).
- Target audience (the WPL should indicate which persons the course is mostly addressed to, e.g., MSc students, Post-Doc students, engineers, research scientists, etc.).
- Prerequisites (the WPL should indicate what background knowledge is required to follow the course module, and also indicate which other courses offered by GRE@T-PIONEER are recommended before starting the given course module).
- Examination/assessment (the WPL should indicate how the students are examined/assessed).
- Course credits (as a rule, one week of full-time studies represent 1.5 ECTS; the pre- and in/post-class activities should thus correspond to ca. 3 ECTS; the hands-on exercises on the training





reactors should be counted separately and represent between 2 and 3 ECTS on their own, depending on the duration of the labs).

The Coordinator is responsible for publishing the above information on the LMS and on the GRE@T-PIONEER website <https://great-pioneer.eu/>.

5.3. Handbooks

The handbooks are each divided into several chapters. The chapters are created independently from each other, to ease the creation of each chapter that is typically associated to one (or very few) teacher(s).

As the course modules can be taken independently from each other, each handbook should be self-contained (additional references to the other course modules are also welcome). The contents of the handbooks should be agreed upon between the various teachers involved in a course module, with clear responsibilities given to each teacher for the creation of the handbooks.

Despite the complexity of the topics covered in the handbooks, it is essential that the handbooks are prepared having in mind that the information presented in the handbooks is “digestible” within 40 hours of study time per handbook. Those 40 hours also include watching the webcasts and answering the quizzes.

In order to provide a common layout of the handbooks, a Word template and a LaTeX template should be used for each chapter. Those templates are accessible on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-10234>.

Concerning the dissemination of the handbooks, the following applies, as detailed in the deliverable D9.3 (Demazière, 2021):

- Unlimited access for all registered students on the LMS when the courses are running. In case of use of copyright-protected materials that cannot be made directly available, access to such materials will be managed as far as possible using the students’ own access to such resources (e.g., via the subscriptions of their respective institution or through library services available to the general public when available).
- Open access within 6 months after the completion of the project via the project website and on the open repository Zenodo.org in accordance with possible restrictions imposed by the use of copyright-protected materials (the corresponding agreements restricting open access will be provided to the EC). When such restrictions exist, references to the copyright-protected materials will be provided instead.

It is the responsibility of the teachers developing the chapters to guarantee the open access of the developed materials and to seek permissions to reuse materials, when relevant. Each teacher using copyrighted materials should put the approved copyrights on Flexx in the directory <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11194> and the denied copyrights in the





directory <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11195> using the following naming convention WPx_chaptery.pdf (with x representing the WP number and y the chapter number).

It is the responsibility of the WPL, with the help from the TL and concerned teachers, to gather each chapter, when ready, in the following directory on Flexx <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11188> using the following naming convention WPx_chapter_y.pdf (with x representing the WP number and y the chapter number). The Coordinator is responsible for uploading the handbooks on the LMS and later on the project website and on Zenodo.org.

5.4. Teasers

The teaser videos are meant at advertising the course modules widely and will be published on the GRE@T-PIONEER website <https://great-pioneer.eu/>. A teaser video should be associated to each course module. Such teasers should be of short duration (max. 3 min) and should be prepared so that:

- They present the overall content of the course module.
- All teachers involved in a course module are briefly introduced.
- The innovative aspects of the course module, both content-wise and pedagogy-wise, should be highlighted.
- The course modules are presented in an appealing manner to attract as many as possible students.

A separate teaser video will be produced collectively for the hands-on exercises on the three training facilities. Each training facility will make a 30 s – 1 min recording of the facility. The Coordinator will thereafter create a teaser video collecting the videos from each facility and wrap them up with some additional information.

The teaser videos should not contain any copyrighted materials. Concerning the dissemination of the teasers, the following applies, as detailed in the deliverable D9.3 (Demazière, 2021): immediate open access via the project website and archival on the open repository Zenodo.org.

The development of the teaser videos will be more exactly settled when the production process has been decided and a PowerPoint template will be made available on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11196>

The produced videos will be uploaded on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11189> using the following naming convention WPx_teaser.mp4 (with x representing the WP number). The Coordinator is responsible for uploading the videos on Flexx and on publishing them on the GRE@T-PIONEER website and on Zenodo.org.





5.5. Webcasts

The webcasts are meant at extracting the main concepts presented in the handbooks in a “simplified” manner. The goal of the webcast is to help the students build their conceptual understanding of the subjects presented in the handbooks. The webcasts should not be seen as a repetition of the handbooks, rather a complement to the handbooks, with the details of the methods left to the handbooks.

Each webcast should be of rather short duration, maximum 10 min. There should be several webcasts per course module. It is the responsibility of each teacher participating to the development of the handbook to prepare the webcasts. There should also be several webcasts per chapter of the handbooks. The number of the webcasts and their topics should be agreed upon with the other teachers involved in the chapter/handbook. The process should be monitored by the TL.

A template for the PowerPoint presentation to be used for the slides can be found on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-file-31135>. The last slide should be the one containing the GRE@T-PIONEER logo in the template. Some space in the slide (right top corner) is reserved for the inclusion of the video – see below.

Concerning the dissemination of the webcasts, the following applies, as detailed in the deliverable D9.3 (Demazière, 2021):

- Unlimited access for all registered students on the LMS when the courses are running.
- Open access within 6 months after the completion of the project via the project website and on the open repository Zenodo.org.

Only copyrighted materials for which approval was obtained for re-use from the copyright holder should be used. Each teacher using copyrighted materials should put the approved copyrights on Flexx in the directory <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11198>.

For preparing the webcasts, the following recommendations should be followed:

- Each teacher should use his/her own recording software, as provided by his/her university (such as Camtasia, OBS Studio, BigBlueButton, etc.).
- A video of the teacher should be included. A neutral background should be used. Ideally, two light sources located on each side of and behind the camera should be used, in order to avoid undesirable shadows behind the teacher.
- Audio should be recorded with the best possible quality. A very good microphone is essential for making the recordings. The microphone from the computer should definitely not be used, and a microphone from a headset gives a somewhat poor sound quality.
- If possible, a device allowing annotating the slides (Tablet PC, Wacom pad, iPad) should be used in order to make the presentation more vivid.
- The original file allowing editing separately the screen capture, the video stream and the audio stream should be kept by the teacher making the recording, so that post-editing is possible. In this respect, the teacher should make clear transitions between the slides and should have a 1 s



transition time between the slides without saying anything, so that potentially removing/editing some part of the recording is possible.

- Having the video of the teacher visible during the entire recording might not be necessary. It is nevertheless required to have the video at least at the beginning and end of the recording, and at a few key times during the recording.
- The output of the webcast should look like as depicted in Figure 3.

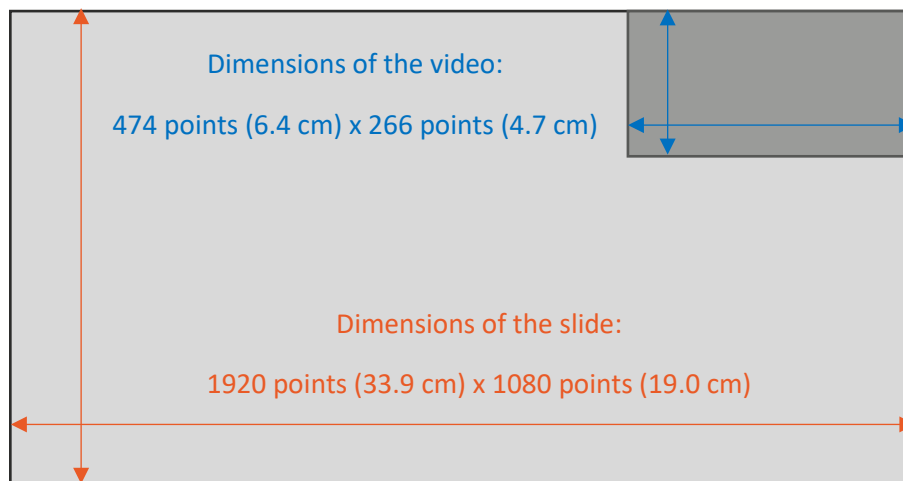


Figure 3. Display layout of the webcast (figure not to scale).

The produced webcasts will be uploaded on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11190> using the following naming convention WPx_chaptery_webcastz.mp4 (with x representing the WP number, y the chapter number and z the webcast number within the considered chapter of the considered WP). When creating the mp4 files, a high-quality video should be produced. Make sure that the resolution is at least 1920 points x 1080 points, that the frame rate is at least 30 frames/second and that the audio quality is at least 128 kbps. The Coordinator is responsible for uploading the webcasts on the LMS and later on the project website and on Zenodo.org.

5.6. Quizzes

The quizzes have two functions: to provide to the students some feedback about their learning (formative feedback) and to provide to the teachers some information about student progress and understanding. For the latter, the learning analytics capabilities of the LMS will be used. The quizzes are designed directly on the LMS and by the teachers participating to the creation of the handbooks in the respective course modules. The process of quiz creation is monitored by the TL and WPL.

Although the quizzes should test student understanding, they also represent an opportunity to force the students to process the knowledge they gathered in the handbooks and in the webcasts. The quiz questions should thus target thinking skills in Bloom's taxonomy higher than merely remembering. As described in Section 3.5, there are many possible types of quiz questions on the LMS, and the appropriate quiz question types should be found throughout the various parts of the handbooks.





Moreover, depending on the answers provided by the students, some feedback can also be provided to the students via the LMS. It is highly recommended to design quiz questions with feedback to the students.

Concerning the dissemination of the quizzes, the following applies, as detailed in the deliverable D9.3 (Demazière, 2021):

- Unlimited access for all registered students on the LMS when the courses are running.
- Open access within 6 months after the completion of the project via the project website and on the open repository Zenodo.org.

Information about the quizzes to be distributed within the consortium should be put on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11201>.

The Coordinator is responsible for making the quizzes available on the project website and on Zenodo.org.

5.7. Hands-on

The hands-on sessions represent the crucial part of the course modules, during which interactions between the students and teachers occur. Such sessions should be designed by the teachers leading the hands-on sessions, in concertation with the TL and WPL. Using active learning techniques adapted to the topics covered during the hands-on sessions and that can be offered in a hybrid set-up represent one of the major challenges.

Some of the hands-on exercises might be directly implemented on the LMS or accessible via the LMS, although large variations exist between the hands-on depending on the topic being covered.

In order to warm-up the students and make them comfortable with the active learning strategy, it is recommended to start the synchronous sessions with a very short summary of the key concepts the students should have learned via the handbooks, webcasts and quizzes, followed by more interactive discussions on the quizzes. Since the students should have worked on the quizzes, discussing the quizzes with them represent a good opportunity to engage them. The quizzes can also be used by the teachers as an opportunity to clarify difficult concepts and erroneous understanding. Thereafter, the sessions should focus on specifically designed active learning techniques. Examples of active learning techniques are given in the deliverable D1.1 – Section 7 (Jaiyeola et al., 2021) and were also discussed during the workshop on course design principles and implementation organized by the consortium – see Section 4.2 of this document.

Concerning the dissemination of the hands-on exercises, the following applies, as detailed in the deliverable D9.3 (Demazière, 2021):

- For the research reactor-based hands-on training exercises:
 - Unlimited access for all students during the synchronous sessions and on the LMS when the project is running (in accordance with the local rules for accessing the research facilities).





- Open access to the description and instructions of the exercises within 6 months after the completion of the project via the project website and on the open repository. Proprietary data and sensitive information about the facilities will be removed from the teaching materials. Due to the unique nature of the facilities (thus making the exercises facility-specific), no solution will be provided.
- For the software-based hands-on training exercises dedicated to code usage (i.e., when the exercises rely on the use of third-parties simulation tools specific to the nuclear industry) – only access to the teaching materials developed by the consortium is detailed below (access to third parties simulation tools is not the responsibility of the consortium):
 - Unlimited access for all registered students during the synchronous sessions and on the LMS when the project is running.
 - No open access for students after the completion of the project. Nevertheless, when the courses are given again after the completion of the project (possibly charging a small course fee), access will be granted during the thus offered synchronous sessions and on the LMS.
 - Access to the teaching materials for other teachers and after the completion of the project should be directly requested by those teachers to the Coordinator, who will then forward the request to the concerned consortium partners (possibilities of contacting the Coordinator after the completion of the project will be implemented). The request will then be examined and handled in accordance with the Intellectual Property (IP) policies of those partners. Sensitive and proprietary documents and data will not be made available. Access to the solutions will only be provided to the teachers in forms of input files (no document explaining how to run the exercises will be prepared).
- For the hands-on training exercises dedicated to method implementation (those exercises might rely on the use of third parties modelling software) – only access to the teaching materials developed by the consortium is detailed below (access to third parties modelling software is not the responsibility of the consortium):
 - Unlimited access for all registered students during the synchronous sessions and on the LMS when the project is running.
 - No open access for students after the completion of the project. Nevertheless, when the courses are again given after the completion of the project (possibly charging a small course fee), access will be granted during the thus offered synchronous sessions and on the LMS.
 - Access to the teaching materials for other teachers and after the completion of the project should be directly requested by those teachers to the Coordinator, who will then forward the request to the concerned consortium partners (possibilities of contacting the Coordinator after the completion of the project will be implemented). The request will then be examined and handled in accordance with the IP policies of those partners. For computer-based exercises, access to the solutions will be only provided to the teachers in forms of input files (no document explaining how to run the exercises will be prepared).

Information about the hands-on to be distributed within the consortium should be put on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11191>.





5.8. Examination/assessment

Because of the variety of the course modules and hands-on exercises, the examination and assessment will vary greatly from one course module to another. As earlier stated, each course module is considered to be worth 3 ECTS (pre-, in- and post-class activities). The hands-on exercises on the training reactors should be counted separately and represent between 2 and 3 ECTS on their own, depending on the duration of the labs.

The implementation of the examination and assessment forms is the responsibility of the corresponding TL.

Information about the examination and assessment to be distributed within the consortium should be put on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11192>.

5.9. Feedback on course modules

Feedback on the course modules will be gathered in various ways:

- Feedback will be gathered from the students primarily using the learning analytics capabilities of the LMS. This feedback will be used to adjust the synchronous sessions using JiTT. Moreover, possibility to provide comments and rate the different course elements available on the LMS will be offered. Finally, end-of-course evaluation questionnaires will be developed and distributed to the students via the LMS. Providing comments, rating and filling the course module questionnaires will be anonymous.
- The teachers involved in the development of the teaching materials will be able to comment on each other's materials.
- The members of the AB and EUG will have access to all teaching materials and will thus have the possibility to provide feedback.

The teachers are responsible for using the learning analytics capabilities of the LMS to gather feedback on student learning. The Coordinator is responsible for implementing on the LMS measures allowing gathering student comments and rating of the various course elements, and for developing end-of-course questionnaires. The Coordinator is also responsible for providing the relevant course materials to the AB and EUG members. The Coordinator will aggregate the various feedback streams and make them available to the entire consortium on Flexx at <https://app.flexx.camp/mso/ecm/greatpioneer-ecm-folder-11202>.



5.10. Development process

The process summarizing the development of course materials is sketched in Figure 4, where the initial development phase is considered separately from the phase where the course modules are offered on a regular basis.



Figure 4. Life cycle of the development process of the course materials.

6. Conclusions

This report gathers in one single document the essence of the strategy followed by the GRE@T-PIONEER consortium for developing the course materials, giving the corresponding courses, and further improving those. A set of common guidelines and principles from course creation to course offering is presented. This report is primarily addressed to the teachers involved in the project and should be considered as a practical roadmap for the development of the various course elements.

7. References

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8. Appendix A – Results of the inventory of the resources available to the consortium



Inventory - CHALMERS

As part of Task 1.5, an inventory of the available “tools” needed to carry out the project needs to be performed. The inventory should include all aspects allowing a proper execution of the project. Please fill in the tables concerning the following points:

- Learning Management System.
- Recording studio.
- Screencasting.
- On-line quizzes.
- Active Learning Classroom.

In addition, depending on the course modules you are involved in/will develop and the corresponding needs, please fill in the additional tables related to:

- Nuclear-specific simulation software.
- General purpose coding software.
- Laboratory exercises.


In case you need a tool not fitting in any of the category above, please fill in the table “Other tool” found at the end of the document.

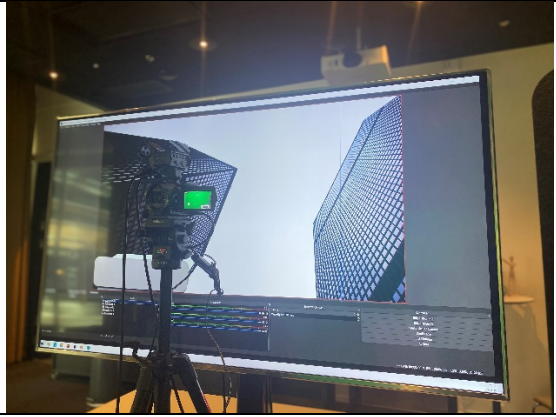
In case you need to use several tools within a given category listed above, please replicate the necessary table(s) and fill them in.

Learning Management System (LMS)

Do you have access to an LMS?	Yes
If yes:	
Which one?	Canvas
Is this LMS administered by your organization?	Yes
Could access to this LMS be granted to the partners of the consortium with “teacher rights”?	Most likely yes, but this needs to be discussed internally at Chalmers
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes Yes
How would you rate this LMS?	Very good
Please provide any additional comment, if need be:	Contact: Hugo Landgren hugo.landgren@chalmers.se


Recording studio

Do you have access to a recording studio (for recording video lectures)?	Yes: Studio Decibel, Lindholmen Conference Centre
If yes:	
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	1 green screen (maximum 3 persons can fit in front) With PPT slides on one laptop, this will be shown next to you on the tv screen in front of you (same view as the digital viewers would have).
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	

	
<p>If available, please provide links to examples of past recordings:</p>	
<p>Do you need to pay a fee for using this studio?</p>	<p>Yes</p>
<p>If yes, please describe the pricing system:</p>	<p>Basic studio package = 12 kkr (+VAT) per booking. This includes:</p> <ul style="list-style-type: none"> 1 green screen 3 studio lights 1 set camera, unmanned 2 set microphones 1 streaming computer + 1 extra screen 1 65" screen, for the presenter to see the streaming live CAM link 1 technician (studio producer) 6 hours 1 tech check (2 hours) <p>Additional charges may apply depending on specific needs and requirements.</p> <p>+</p> <p>Studio room rate (which varies from time to time depending on the time of the year). In January 2021: 4.8 kkr for a full day and 4.0 kkr for a half day. If the complete invoice is addressed to Chalmers, one gets a 40% discount on the studio room rate on each booking. There is no discount on the Basic studio package.</p> <p>+</p> <p>Possible extra fee for post-processing</p>
<p>Does your organization provide support for using this studio and for post-processing the recordings?</p>	<p>Yes. A technician (studio producer) is present while live sending (as the technical equipment belongs to Lindholmen Conference Centre, the technician is in charge). For any assistance for post processing there will be an additional charge, depending on the specific request.</p>
<p>Could the other partners of the consortium use this recording studio?</p>	<p>Yes</p>

<p>If yes, would the other partners need to pay a fee for using the studio?</p>	<p>Yes</p>
<p>If yes, please describe the pricing system:</p>	
<p>Please provide any additional comment, if need be:</p>	<p>In order to make recordings, in addition to basic technical package, a USB stick (additional 500 kr) needs to be purchased from Studio Decibel (they do not accept external USB sticks on their computers). With the USB stick, there will be enough space to save recordings, PPT, background and movies.</p> <p>Before a recording, one needs to have the content ready, any digital name badges, PPT, background (shown behind the speaker and the PPT on the screen) on the USB stick.</p> <p>When ready, the speaker will stand in front of the camera and do his/her presentation as Studio Decibel records.</p> <p>When ready, one will get the USB stick back. It is possible to post-edit the recording (to be done on one's own). There is nevertheless no possibility to change the PPT or background when the presentations is recorded on to the stick.</p> <p>In front of the camera, there can be maximum 2 persons (with corona distance) standing. If the recording is itself 2 hours long, one needs to be onsite minimum 1 hour before and at least 30 min after, in order to prepare the digital screen with the technician and to wrap up afterwards.</p> <p>Contact: Malin Johnsson malin.johnsson@chalmerskonferens.se</p>

Recording studio

Do you have access to a recording studio (for recording video lectures)?	Yes: Faraday ALC studio, the University of Gothenburg (Physics)
If yes:	
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	<ul style="list-style-type: none"> • Computer for recording and editing, including camera and microphone • Microphone of studio type as well as mosquito microphone (Røde Wireless GO) • Software: Camtasia, GU Play and OBS (for recording) • Document camera (Logitech PTZ pro) • Studio lights for good lighting (Aputure Amaran) • Green screen for so-called keying, meaning that the filmed teacher can be placed in front of any background, for example "inside" a visual presentation • Possibility to write on a transparent glass with a gray fabric background. This is of a more simple version not suitable for a dark background and has no slide/ppt/pdf options.
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	
If available, please provide links to examples of past recordings:	
Do you need to pay a fee for using this studio?	For people working at Gothenburg Physics Centre (Chalmers and GU), it is possible to borrow the facility a few times (i.e. at no cost).
If yes, please describe the pricing system:	
Does your organization provide support for using this studio and for post-processing the recordings?	No
Could the other partners of the consortium use this recording studio?	No. The recording part in the room is owned by the natural science faculty at University of Gothenburg. This makes it a bit difficult to give access to people outside the organization. Nevertheless, a possible agreement for using this studio for people not belonging to Chalmers and the University of Gothenburg would need to be discussed with the faculty.
If yes, would the other partners need to pay a fee for using the studio?	

If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	To use the recording part, a GU X-account is needed. Contact persons at the University of Gothenburg: Jonas Enger Jonas.Enger@physics.gu.se and Jakob Welander jakob.welander@physics.gu.se

Recording studio

Do you have access to a recording studio (for recording video lectures)?	Blended Learning Team
If yes:	
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	Green screen, cams, mics
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	
If available, please provide links to examples of past recordings:	
Do you need to pay a fee for using this studio?	?
If yes, please describe the pricing system:	
Does your organization provide support for using this studio and for post-processing the recordings?	Yes
Could the other partners of the consortium use this recording studio?	?
If yes, would the other partners need to pay a fee for using the studio?	?
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	<p>Not sure yet whether the studio could be used for anything else than production of videos for Chalmers regular education – needs to be discussed internally</p> <p>Contact: Hugo Landgren hugo.landgren@chalmers.se</p>

Screencasting

Do you have access to a screencasting software?	Yes
If yes:	
Which one?	Kaltura Desktop
Is this screencasting software administered by your organization?	Yes
Could the other partners of the consortium use this screencasting software free of charge?	?
Does this screencasting software contain basic post-editing capabilities?	Yes
How would you rate the screencasting software?	Somewhat good
Please provide any additional comment, if need be:	The post-editing capabilities are very basic. Contact at Chalmers: Hugo Landgren hugo.landgren@chalmers.se

Screencasting

Do you have access to a screencasting software?	Yes
If yes:	
Which one?	Camtasia
Is this screencasting software administered by your organization?	No
Could the other partners of the consortium use this screencasting software free of charge?	No
Does this screencasting software contain basic post-editing capabilities?	Yes
How would you rate the screencasting software?	Do not know (never used it, but highly recommended software by the Chalmers Blended Learning Team)
Please provide any additional comment, if need be:	Chalmers has a limited license. Contact at Chalmers: Hugo Landgren hugo.landgren@chalmers.se

On-line quizzes

Do you have access to a web-based platform for online quizzes?	Yes
If yes:	
Which one?	Canvas
Is this platform administered by your organization?	Yes
Could the other partners of the consortium use this platform free of charge?	Most likely yes, but this needs to be discussed internally at Chalmers
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes Yes
How would you rate the platform?	Do not know (never used it)
Please provide any additional comment, if need be:	Also access to online quizzes connected to videos posted on Chalmers Play. Nevertheless, the capabilities of the quiz system are very limited. No plan to enhance those capabilities on Chalmers Play. Contact at Chalmers: Hugo Landgren hugo.landgren@chalmers.se

Active Learning Classroom (ALC)

Do you have access to an Active Learning Classroom?	Yes
If yes:	
Could you describe as precisely as possible the capabilities of this room (e.g. moveable furniture, collaborative learning equipment – screens/whiteboards, computer screens/TV screens, digital boards, etc.):	Moveable furniture Whiteboards On-site attendance limited to 25 persons (15 ideal)
Can this room be used for distant learning as well?	Yes
If yes, please describe as precisely as possible the equipment in the room allowing interacting with the remote students:	Sharing of contents both to the on-site and off-site attendees: screensharing + audio (via dedicated mics and loudspeakers) + videos (via dedicated webcams). The audio and video is further handled by a dedicated hardware, making the audio and video streams more easy to be streamed.
If available, please provide links describing the set-up and/or showing the capabilities of the room:	http://nephy.chalmers.se/staff-pages/demaz/Peer-reviewed_conference_contributions/wref_079.pdf
Do you need to pay a fee for using this room?	No
If yes, please describe the pricing system:	
Does your organization provide support for using this room?	No
Could the other partners of the consortium use this room?	Yes
If yes, would the other partners need to pay a fee for using the room?	No (at present)
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	Own design of the room and full rights to modify the room at own convenience.

Nuclear-specific simulation software

Which nuclear-specific simulation software do you need, if any?	CASMO-4/SIMULATE-3
Please indicate in which tasks you need to use this software:	T4.3 + 8.2
Please describe the type of license associated to this software:	Commercial license (university license would apply in such a case)
What kind of agreement is required for the students to use this software?	None (restrictions may apply in case a student belongs to a company being a competitor to Studsvik Scandpower)
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	A remote access to the tools hosted by Studsvik Scandpower is being discussed
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Probably yes (on-going discussion), but restrictions may apply in case a student belongs to a company being a competitor to Studsvik Scandpower
Is there any restriction for using the software based on the students' citizenship?	?
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	No (the purpose of the exercises is to demonstrate the applicability of the tool, not so much the details of how to use them)
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	Contact at Studsvik Scandpower: Christian Jönsson christian.jonsson@studsvik.com It is probable that Studsvik Scandpower could consider similar arrangements with the other consortium partners as the one being discussed with Chalmers.

General purpose coding software

Which general purpose software do you need, if any?	Matlab Grader
Please indicate in which tasks you need to use this software:	T3.2 + 3.3 + 8.2 T4.3 (+ possibly 4.4) + 4.5 + 8.2 T5.4 + 5.5 + 8.2
Please describe the type of license associated to this software:	Commercial license
What kind of agreement is required for the students to use this software?	No specific agreement necessary, as long as the teacher has a campus license (all students can get access to Matlab Grader). Nevertheless, if Matlab Grader is offered within Canvas, only students having access to Canvas (usually the students from that specific university) will have access to Matlab Grader.
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	Access to a web-based platform, with no need to download/install anything + Possibility to download a free 30 day trial version of the desktop version of Matlab: https://www.mathworks.com/campaigns/products/trials.html?s_iid=hp_ff_p_trial If a more than 30 day trial is required, this should be discussed with the MathWorks (for instance via Rohit Agrawal)
In case the students need to download and install the software, what are the requirements in terms of:	No specific need for Matlab Grader (access via web-browser). For the desktop version of Matlab, see Matlab website. Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	As long as the teacher has a campus license, all students can get access to Matlab Grader. Nevertheless, if Matlab Grader is offered within Canvas, only students having access to Canvas (usually the students from that specific university) will have access to Matlab Grader.
Is there any restriction for using the software based on the students' citizenship?	No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes
If yes:	
Please describe the required training and its extent:	Online small courses with demo/examples/tutorials
Can this training be provided in advance to the students?	Yes

<p>If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):</p>	<p>Online training tutorials accessible via https://matlabacademy.mathworks.com/ (either Matlab Onramp – free – or paid courses accessible via the students’ own license)</p>
<p>Please provide any additional comment, if need be:</p>	<p>Teachers having a campus license have access to Matlab Grader. Contact should be taken with the respective MathWorks engineer. For teachers not having a campus license, this should be discussed with the MathWorks (Rohit Agrawal can find the right contact point).</p> <p>Rohit Agrawal is proposing to organize a webinar, during which he will make a demo of the features and capabilities of Matlab Grader.</p>

Laboratory exercises

Which facility/laboratory do you need, if any?	Yes/No
Please indicate in which tasks you need to use this facility/laboratory:	
Is there any restriction for using the facility/laboratory based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the facility/laboratory:	
Is any training required to access/use the facility/laboratory:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Can the exercise:	
<ul style="list-style-type: none"> • Be offered entirely on-site: 	Yes/No
<ul style="list-style-type: none"> • Be offered in a hybrid set-up, i.e. with some students on-site and some students off-site: 	Yes/No
<ul style="list-style-type: none"> • Be offered entirely off-site (i.e. on the web): 	Yes/No
In case the exercise can be offered to remote students, what set-up is possible:	
<ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>without</i> remote handling by the off-site students: 	Possible/Not possible
<ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>with</i> remote handling by the off-site students: 	Possible/Not possible
<ul style="list-style-type: none"> • Fully virtual exercise mimicking the actual exercise: 	Possible/Not possible
<ul style="list-style-type: none"> • Other set-up? 	Please describe
Please provide any additional comment, if need be:	

Other tool

Which other tool do you need, if any?	
Please indicate in which tasks you need to use this tool:	
Please describe the tool:	
Can the tool be used by remote students?	Yes/No
How will the students access the tool?	
Is there any restriction for using the tool based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the tool:	
Is any training required to use the tool:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Inventory - EPFL

As part of Task 1.5, an inventory of the available “tools” needed to carry out the project needs to be performed. The inventory should include all aspects allowing a proper execution of the project. Please fill in the tables concerning the following points:

- Learning Management System.
- Recording studio.
- Screencasting.
- On-line quizzes.
- Active Learning Classroom.

In addition, depending on the course modules you are involved in/will develop and the corresponding needs, please fill in the additional tables related to:

- Nuclear-specific simulation software.
- General purpose coding software.
- Laboratory exercises.

In case you need a tool not fitting in any of the category above, please fill in the table “Other tool” found at the end of the document.

In case you need to use several tools within a given category listed above, please replicate the necessary table(s) and fill them in.

Learning Management System (LMS)

Do you have access to an LMS?	Yes
If yes:	
Which one?	a) Moodle https://moodle.epfl.ch b) https://courseware.epfl.ch
Is this LMS administered by your organization?	Not sure
Could access to this LMS be granted to the partners of the consortium with “teacher rights”?	Yes
Does this platform provide learning analytics data?	a) No, you get some stats about the responses of students, but not details about how many people enrolled when, from where they come, etc. b) Yes, you get insights: https://edx.readthedocs.io/projects/edx-insights/en/latest/Overview.html and we also collect clickstreams for people who do research on learning.
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Not sure
How would you rate this LMS?	a) works well; no experience with b)
Please provide any additional comment, if need be:	

Recording studio

Do you have access to a recording studio (for recording video lectures)?	Yes
If yes:	
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	Unclear at this point
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	Best known resource but not very details (https://go.epfl.ch/flexible-teaching)
If available, please provide links to examples of past recordings:	
Do you need to pay a fee for using this studio?	Yes
If yes, please describe the pricing system:	EPFL a professional team, recording studios etc, and also a course about how to produce courses which is ready soon. If you need support to produce such an online course, there is the DRIL fund with a deadline next monday. https://go.epfl.ch/dril
Does your organization provide support for using this studio and for post-processing the recordings?	Yes. If you need support to produce such an online course, there is the DRIL fund with a deadline next monday. https://go.epfl.ch/dril
Could the other partners of the consortium use this recording studio?	unsure
If yes, would the other partners need to pay a fee for using the studio?	unsure
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Screencasting

Do you have access to a screencasting software?	unsure
If yes:	
Which one?	
Is this screencasting software administered by your organization?	
Could the other partners of the consortium use this screencasting software free of charge?	
Does this screencasting software contain basic post-editing capabilities?	
How would you rate the screencasting software?	
Please provide any additional comment, if need be:	

On-line quizzes

Do you have access to a web-based platform for online quizzes?	Yes
If yes:	
Which one?	a) and b) allow for quizzes. For live responding, there is a web based version of responseware (Turning Point)
Is this platform administered by your organization?	Unsure
Could the other partners of the consortium use this platform free of charge?	Yes
Does this platform provide learning analytics data?	See LMS response
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	
How would you rate the platform?	I have a very positive experience with Turning Point
Please provide any additional comment, if need be:	

Active Learning Classroom (ALC)

Do you have access to an Active Learning Classroom?	Unsure (answers provided by EPFL did not help)
If yes:	
Could you describe as precisely as possible the capabilities of this room (e.g. moveable furniture, collaborative learning equipment – screens/whiteboards, computer screens/TV screens, digital boards, etc.):	
Can this room be used for distant learning as well?	Yes/No
If yes, please describe as precisely as possible the equipment in the room allowing interacting with the remote students:	
If available, please provide links describing the set-up and/or showing the capabilities of the room:	
Do you need to pay a fee for using this room?	Yes/No
If yes, please describe the pricing system:	
Does your organization provide support for using this room?	Yes/No
Could the other partners of the consortium use this room?	Yes/No
If yes, would the other partners need to pay a fee for using the room?	Yes/No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Nuclear-specific simulation software

Which nuclear-specific simulation software do you need, if any?	GeN-Foam
Please indicate in which tasks you need to use this software:	4.3, 4.4, 5.4
Please describe the type of license associated to this software:	GNU GPL v3
What kind of agreement is required for the students to use this software?	none
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	download and install
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: Linux, iOS or Linux subsystem for Windows CPU: 1 to 8 RAM: 2 to 8 GB Disk space: 1 to 10 GB Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Yes/No
Is there any restriction for using the software based on the students' citizenship?	No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	It is not strictly necessary, but recommended
If yes:	
Please describe the required training and its extent:	Some preparatory work can be performed by students (~1 week of preparation), followed by few hours of introduction, and access to a discussion forum for continuous support
Can this training be provided in advance to the students?	Yes
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	- Preparatory material to be sent a couple of weeks before the training - Online training in the form of a webinar - Access to discussion forum for users

General purpose coding software

Which general purpose software do you need, if any?	none
Please indicate in which tasks you need to use this software:	
Please describe the type of license associated to this software:	
What kind of agreement is required for the students to use this software?	
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Yes/No
Is there any restriction for using the software based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Laboratory exercises

Which facility/laboratory do you need, if any?	CROCUS, LRS controlled zone
Please indicate in which tasks you need to use this facility/laboratory:	Most WP
Is there any restriction for using the facility/laboratory based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the facility/laboratory:	
Is any training required to access/use the facility/laboratory:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Can the exercise: <ul style="list-style-type: none"> • Be offered entirely on-site: • Be offered in a hybrid set-up, i.e. with some students on-site and some students off-site: • Be offered entirely off-site (i.e. on the web): 	<p>Yes</p> <p>Unsure, most likely yes with a reduced experience for the students off-site</p> <p>Most likely yes with a reduced experience for the students off-site</p>
In case the exercise can be offered to remote students, what set-up is possible: <ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>without</i> remote handling by the off-site students: • Sharing of audio/video/digital contents of the actual exercise in real time <i>with</i> remote handling by the off-site students: • Fully virtual exercise mimicking the actual exercise: • Other set-up? 	<p>Possible</p> <p>Partly Possible (detector acquisition system handling – NOT the reactor unsure</p> <p>none</p>
Please provide any additional comment, if need be:	

Other tool

Which other tool do you need, if any?	none
Please indicate in which tasks you need to use this tool:	
Please describe the tool:	
Can the tool be used by remote students?	Yes/No
How will the students access the tool?	
Is there any restriction for using the tool based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the tool:	
Is any training required to use the tool:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Inventory - TUM

As part of Task 1.5, an inventory of the available “tools” needed to carry out the project needs to be performed. The inventory should include all aspects allowing a proper execution of the project. Please fill in the tables concerning the following points:

- Learning Management System.
- Recording studio.
- Screencasting.
- On-line quizzes.
- Active Learning Classroom.

In addition, depending on the course modules you are involved in/will develop and the corresponding needs, please fill in the additional tables related to:

- Nuclear-specific simulation software.
- General purpose coding software.
- Laboratory exercises.

In case you need a tool not fitting in any of the category above, please fill in the table “Other tool” found at the end of the document.

In case you need to use several tools within a given category listed above, please replicate the necessary table(s) and fill them in.

Learning Management System (LMS)

Do you have access to an LMS?	Yes
If yes:	
Which one?	Moodle
Is this LMS administered by your organization?	Yes
Could access to this LMS be granted to the partners of the consortium with “teacher rights”?	Yes
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes Yes
How would you rate this LMS?	very good
Please provide any additional comment, if need be:	We have used this system for more than five years and it works very well for the teaching of multiple courses.

Recording studio

Do you have access to a recording studio (for recording video lectures)?	Not easily, but can be booked on request.
If yes:	
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	Never used. No much information available now.
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	
If available, please provide links to examples of past recordings:	
Do you need to pay a fee for using this studio?	No
If yes, please describe the pricing system:	
Does your organization provide support for using this studio and for post-processing the recordings?	Yes
Could the other partners of the consortium use this recording studio?	Not sure
If yes, would the other partners need to pay a fee for using the studio?	Yes/No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Screencasting

Do you have access to a screencasting software?	Yes
If yes:	
Which one?	Camtasia; CamStudio; OBS Studio
Is this screencasting software administered by your organization?	Camtasia Yes, the others no.
Could the other partners of the consortium use this screencasting software free of charge?	CamStudio and OBS Studio yes
Does this screencasting software contain basic post-editing capabilities?	Yes
How would you rate the screencasting software?	Camtasia very good; CamStudio and OBS Studio good.
Please provide any additional comment, if need be:	

On-line quizzes

Do you have access to a web-based platform for online quizzes?	Yes
If yes:	
Which one?	Moodle
Is this platform administered by your organization?	Yes
Could the other partners of the consortium use this platform free of charge?	Not sure
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes Yes
How would you rate the platform?	very good
Please provide any additional comment, if need be:	

Active Learning Classroom (ALC)

Do you have access to an Active Learning Classroom?	No
If yes:	
Could you describe as precisely as possible the capabilities of this room (e.g. moveable furniture, collaborative learning equipment – screens/whiteboards, computer screens/TV screens, digital boards, etc.):	
Can this room be used for distant learning as well?	Yes/No
If yes, please describe as precisely as possible the equipment in the room allowing interacting with the remote students:	
If available, please provide links describing the set-up and/or showing the capabilities of the room:	
Do you need to pay a fee for using this room?	Yes/No
If yes, please describe the pricing system:	
Does your organization provide support for using this room?	Yes/No
Could the other partners of the consortium use this room?	Yes/No
If yes, would the other partners need to pay a fee for using the room?	Yes/No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Nuclear-specific simulation software

Which nuclear-specific simulation software do you need, if any?	ATHLET, PARCS; DYN3D
Please indicate in which tasks you need to use this software:	WP6: the hands-on training of the use of coupled codes for nuclear safety analyses
Please describe the type of license associated to this software:	Free for educational purpose
What kind of agreement is required for the students to use this software?	Register for the course or writing thesis in the institute
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	Log in to a server hosted by my organization
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	No
Is there any restriction for using the software based on the students' citizenship?	No for ATHLET or the neutronics software. Yes for MCNP6 and SCALE
If yes, which nationalities are forbidden to use the software:	No restriction
Is any training required to use the software:	Yes
If yes:	
Please describe the required training and its extent:	Knowledge of basic nuclear reactor and thermal-hydraulics.
Can this training be provided in advance to the students?	No.
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	Use of the software is possible to explain prior to the classes or during special classes.

General purpose coding software

Which general purpose software do you need, if any?	PYTHON3.8; Octave; Matlab
Please indicate in which tasks you need to use this software:	Script preparation for the automatization of computational chains.
Please describe the type of license associated to this software:	Free PYTHON3.8 and Octave. Academic fee for Matlab.
What kind of agreement is required for the students to use this software?	PYTHON3.8 and Octave none. Matlab a student or personal license.
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	Personal use in their computers recommended.
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: Windows10; Linux CPU: Intel i3 to i7; AMD Ryzen RAM: minimum 8 GB Disk space: No applicable. Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	
Is there any restriction for using the software based on the students' citizenship?	No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes
If yes:	
Please describe the required training and its extent:	Previous knowledge would be a plus. No in-depth knowledge needed.
Can this training be provided in advance to the students?	No;
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	Small recorded lectures can be used for the purpose described below.
Please provide any additional comment, if need be:	but they can be trained in using the scripts prepared for the exercises. The scripts can be explained and made clear how they must be integrated in the calculation process.

Laboratory exercises

Which facility/laboratory do you need, if any?	Computer lab for exercises
Please indicate in which tasks you need to use this facility/laboratory:	Exercises with nuclear software that cannot be distributed.
Is there any restriction for using the facility/laboratory based on the students' citizenship?	No
If yes, which nationalities are forbidden to use the facility/laboratory:	
Is any training required to access/use the facility/laboratory:	No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Can the exercise:	
<ul style="list-style-type: none"> • Be offered entirely on-site: 	Yes/No
<ul style="list-style-type: none"> • Be offered in a hybrid set-up, i.e. with some students on-site and some students off-site: 	Yes/No
<ul style="list-style-type: none"> • Be offered entirely off-site (i.e. on the web): 	Yes/No
In case the exercise can be offered to remote students, what set-up is possible:	
<ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>without</i> remote handling by the off-site students: 	Possible
<ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>with</i> remote handling by the off-site students: 	Possible
<ul style="list-style-type: none"> • Fully virtual exercise mimicking the actual exercise: 	Possible/Not possible
<ul style="list-style-type: none"> • Other set-up? 	Please describe
Please provide any additional comment, if need be:	

Other tool

Which other tool do you need, if any?	Presentation and on-screen writing software.
Please indicate in which tasks you need to use this tool:	To conduct the lectures.
Please describe the tool:	PowerPoint; MS Whiteboard. MS Teams; Zoom
Can the tool be used by remote students?	Yes
How will the students access the tool?	Own computers or participating in Web-meetings with shared screens.
Is there any restriction for using the tool based on the students' citizenship?	No
If yes, which nationalities are forbidden to use the tool:	
Is any training required to use the tool:	Yes; but very little.
If yes:	
Please describe the required training and its extent:	Basic skills need to use PowerPoint, and a bit of practice using MSTeams and Zoom.
Can this training be provided in advance to the students?	Not needed.
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Inventory - TUD

As part of Task 1.5, an inventory of the available “tools” needed to carry out the project needs to be performed. The inventory should include all aspects allowing a proper execution of the project. Please fill in the tables concerning the following points:

- Learning Management System.
- Recording studio.
- Screencasting.
- On-line quizzes.
- Active Learning Classroom.

In addition, depending on the course modules you are involved in/will develop and the corresponding needs, please fill in the additional tables related to:

- Nuclear-specific simulation software. → available (SERPENT, MCNP, DYN3D, CORESIM)
- General purpose coding software. → available (matlab, python, c++)
- Laboratory exercises. → available (infrastructure AKR-2)

In case you need a tool not fitting in any of the category above, please fill in the table “Other tool” found at the end of the document.

In case you need to use several tools within a given category listed above, please replicate the necessary table(s) and fill them in.

Learning Management System (LMS)

Do you have access to an LMS?	Yes/No
If yes:	Yes
Which one?	OPAL; Online platform for academic teaching and learning
Is this LMS administered by your organization?	No; https://bildungsportal.sachsen.de
Could access to this LMS be granted to the partners of the consortium with “teacher rights”?	Yes
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes/No Yes/No
How would you rate this LMS?	Not good at all
Please provide any additional comment, if need be:	OPAL is not open source and not free! Moodle could be the best choice for GreatPioneer.

Recording studio

Do you have access to a recording studio (for recording video lectures)?	Yes/No
If yes:	Yes
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	Digital white board; slide/screen sharing, stream of video data (teacher and room)
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	https://vcc.zih.tu-dresden.de/index.php
If available, please provide links to examples of past recordings:	
Do you need to pay a fee for using this studio?	No
If yes, please describe the pricing system:	
Does your organization provide support for using this studio and for post-processing the recordings?	Yes
Could the other partners of the consortium use this recording studio?	No
If yes, would the other partners need to pay a fee for using the studio?	Yes/No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Screencasting

Do you have access to a screencasting software?	Yes/No
If yes:	yes
Which one?	gotomeeting, bigbluebutton
Is this screencasting software administered by your organization?	Yes bigbluebutton No gotomeeting
Could the other partners of the consortium use this screencasting software free of charge?	No
Does this screencasting software contain basic post-editing capabilities?	No
How would you rate the screencasting software?	somewhat good
Please provide any additional comment, if need be:	

On-line quizzes

Do you have access to a web-based platform for online quizzes?	Yes/No
If yes:	Yes
Which one?	OPAL; Online platform for academic teaching and learning
Is this platform administered by your organization?	No, ; https://bildungsportal.sachsen.de
Could the other partners of the consortium use this platform free of charge?	Yes
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes Yes
How would you rate the platform?	somewhat good
Please provide any additional comment, if need be:	

Active Learning Classroom (ALC)

Do you have access to an Active Learning Classroom?	No
If yes:	
Could you describe as precisely as possible the capabilities of this room (e.g. moveable furniture, collaborative learning equipment – screens/whiteboards, computer screens/TV screens, digital boards, etc.):	
Can this room be used for distant learning as well?	
If yes, please describe as precisely as possible the equipment in the room allowing interacting with the remote students:	
If available, please provide links describing the set-up and/or showing the capabilities of the room:	
Do you need to pay a fee for using this room?	Yes/No
If yes, please describe the pricing system:	
Does your organization provide support for using this room?	Yes/No
Could the other partners of the consortium use this room?	Yes/No
If yes, would the other partners need to pay a fee for using the room?	Yes/No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Nuclear-specific simulation software

The following reactor simulation software is available: SERPENT, MCNP, DYN3D

Which nuclear-specific simulation software do you need, if any?	
Please indicate in which tasks you need to use this software:	Probably, SERPENT will be used in WP4 → Task 4.3 and Task 4.4. Currently, it is not clarified how all partners contribute to these Tasks.
Please describe the type of license associated to this software:	Distributed by OECD/NEA Data Bank in Europe and is free of charge for non-commercial research and education.
What kind of agreement is required for the students to use this software?	
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	We provide PCs and a server.
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Yes
Is there any restriction for using the software based on the students' citizenship?	No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	No, as far as I have understood we provide the training in the frame of this project?
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

General purpose coding software

We use c++, matlab and python frameworks.

Which general purpose software do you need, if any?	
Please indicate in which tasks you need to use this software:	
Please describe the type of license associated to this software:	
What kind of agreement is required for the students to use this software?	
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Yes/No
Is there any restriction for using the software based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Laboratory exercises

Which facility/laboratory do you need, if any?	AKR-2
Please indicate in which tasks you need to use this facility/laboratory:	Task2.2, Task 3.2, Task4.3, Task4.4, Task5.4, Task6.2, Task 7.2, Task7.3
Is there any restriction for using the facility/laboratory based on the students' citizenship?	Yes
If yes, which nationalities are forbidden to use the facility/laboratory:	
Is any training required to access/use the facility/laboratory:	No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Can the exercise: <ul style="list-style-type: none"> • Be offered entirely on-site: • Be offered in a hybrid set-up, i.e. with some students on-site and some students off-site: • Be offered entirely off-site (i.e. on the web): 	Yes Yes Yes, possible as well, but makes no sense
In case the exercise can be offered to remote students, what set-up is possible: <ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>without</i> remote handling by the off-site students: • Sharing of audio/video/digital contents of the actual exercise in real time <i>with</i> remote handling by the off-site students: • Fully virtual exercise mimicking the actual exercise: • Other set-up? 	Possible Not possible Possible Please describe
Please provide any additional comment, if need be:	

Other tool

Which other tool do you need, if any?	
Please indicate in which tasks you need to use this tool:	
Please describe the tool:	
Can the tool be used by remote students?	Yes/No
How will the students access the tool?	
Is there any restriction for using the tool based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the tool:	
Is any training required to use the tool:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Inventory - BME

As part of Task 1.5, an inventory of the available “tools” needed to carry out the project needs to be performed. The inventory should include all aspects allowing a proper execution of the project. Please fill in the tables concerning the following points:

- Learning Management System.
- Recording studio.
- Screencasting.
- On-line quizzes.
- Active Learning Classroom.

In addition, depending on the course modules you are involved in/will develop and the corresponding needs, please fill in the additional tables related to:

- Nuclear-specific simulation software.
- General purpose coding software.
- Laboratory exercises.

In case you need a tool not fitting in any of the category above, please fill in the table “Other tool” found at the end of the document.

In case you need to use several tools within a given category listed above, please replicate the necessary table(s) and fill them in.

Learning Management System (LMS)

Do you have access to an LMS?	Yes
If yes:	
Which one?	Moodle (from the next semester)
Is this LMS administered by your organization?	Yes (faculty level)
Could access to this LMS be granted to the partners of the consortium with “teacher rights”?	Yes
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes Yes
How would you rate this LMS?	very good
Please provide any additional comment, if need be:	

Recording studio

Do you have access to a recording studio (for recording video lectures)?	No
If yes:	
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	
If available, please provide links to examples of past recordings:	
Do you need to pay a fee for using this studio?	Yes/No
If yes, please describe the pricing system:	
Does your organization provide support for using this studio and for post-processing the recordings?	Yes/No
Could the other partners of the consortium use this recording studio?	Yes/No
If yes, would the other partners need to pay a fee for using the studio?	Yes/No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Screencasting

Do you have access to a screencasting software?	Yes
If yes:	
Which one?	OBS Studio (freeware), Zoom (licensed)
Is this screencasting software administered by your organization?	OBS: individual use, Zoom: Yes (licensed for the institute)
Could the other partners of the consortium use this screencasting software free of charge?	OBS: Yes (freeware)/ Zoom: No
Does this screencasting software contain basic post-editing capabilities?	No
How would you rate the screencasting software?	somewhat good
Please provide any additional comment, if need be:	

On-line quizzes

Do you have access to a web-based platform for online quizzes?	Yes
If yes:	
Which one?	Kahoot, MS Forms, Moodle
Is this platform administered by your organization?	MS Forms, Moodle: Yes Kahoot: No (individual, free use)
Could the other partners of the consortium use this platform free of charge?	Moodle: Yes, others: No
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes Yes
How would you rate the platform?	Forms: somewhat not good Kahoot: somewhat good/ Moodle: very good
Please provide any additional comment, if need be:	Moodle to be used from next semester

Active Learning Classroom (ALC)

Do you have access to an Active Learning Classroom?	No
If yes:	
Could you describe as precisely as possible the capabilities of this room (e.g. moveable furniture, collaborative learning equipment – screens/whiteboards, computer screens/TV screens, digital boards, etc.):	
Can this room be used for distant learning as well?	Yes/No
If yes, please describe as precisely as possible the equipment in the room allowing interacting with the remote students:	
If available, please provide links describing the set-up and/or showing the capabilities of the room:	
Do you need to pay a fee for using this room?	Yes/No
If yes, please describe the pricing system:	
Does your organization provide support for using this room?	Yes/No
Could the other partners of the consortium use this room?	Yes/No
If yes, would the other partners need to pay a fee for using the room?	Yes/No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Nuclear-specific simulation software

Which nuclear-specific simulation software do you need, if any?	Serpent, OpenMC
Please indicate in which tasks you need to use this software:	WP2-8, preparation of hands-on calculation exercises related to BME TR measurements and teaching of the course
Please describe the type of license associated to this software:	Serpent: OECD NEA site-license OpenMC: open source
What kind of agreement is required for the students to use this software?	Serpent: work on-site? OpenMC: not required
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	Log in to server (download is also possible)
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	OpenMC: Yes Serpent: may be problematic from abroad (especially outside the EU)
Is there any restriction for using the software based on the students' citizenship?	No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes
If yes:	
Please describe the required training and its extent:	MC principles and basic user skills
Can this training be provided in advance to the students?	No, this is part of the exercise
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

General purpose coding software

Which general purpose software do you need, if any?	MATLAB
Please indicate in which tasks you need to use this software:	WP2-8, preparation of hands-on calculation exercises related to BME TR measurements and teaching of the course
Please describe the type of license associated to this software:	Educational licence for all students and lecturers of the university
What kind of agreement is required for the students to use this software?	BME student?
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	Download or web-based
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Yes
Is there any restriction for using the software based on the students' citizenship?	No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes
If yes:	
Please describe the required training and its extent:	Basic user skills
Can this training be provided in advance to the students?	Yes
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	Short description
Please provide any additional comment, if need be:	

Laboratory exercises

Which facility/laboratory do you need, if any?	BME Training Reactor (BME TR)
Please indicate in which tasks you need to use this facility/laboratory:	WP2-8, preparation of introductory videos for the exercises and teaching the course
Is there any restriction for using the facility/laboratory based on the students' citizenship?	Yes
If yes, which nationalities are forbidden to use the facility/laboratory:	Countries not being party to or not complying with NPT raise concern due to knowledge export regulations (consent of the Hungarian Atomic Energy Authority is need for the actual case)
Is any training required to access/use the facility/laboratory:	Yes
If yes:	
Please describe the required training and its extent:	Basic safety, security and radiation protection briefing
Can this training be provided in advance to the students?	Yes
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	Handbook+ short videos to be developed in WP7
Can the exercise: <ul style="list-style-type: none"> • Be offered entirely on-site: • Be offered in a hybrid set-up, i.e. with some students on-site and some students off-site: • Be offered entirely off-site (i.e. on the web): 	Yes No. or in a very limited way No
In case the exercise can be offered to remote students, what set-up is possible: <ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>without</i> remote handling by the off-site students: • Sharing of audio/video/digital contents of the actual exercise in real time <i>with</i> remote handling by the off-site students: • Fully virtual exercise mimicking the actual exercise: • Other set-up? 	Possible, but limited Not possible (only software can be remote handled, no hardware) Not possible Sharing measurement results
Please provide any additional comment, if need be:	Remote exercises maybe technically possible with some limitations, but the outcome is pedagogically questionable

Other tool

Which other tool do you need, if any?	
Please indicate in which tasks you need to use this tool:	
Please describe the tool:	
Can the tool be used by remote students?	Yes/No
How will the students access the tool?	
Is there any restriction for using the tool based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the tool:	
Is any training required to use the tool:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Inventory - POLITICO

As part of Task 1.5, an inventory of the available “tools” needed to carry out the project needs to be performed. The inventory should include all aspects allowing a proper execution of the project. Please fill in the tables concerning the following points:

- Learning Management System.
- Recording studio.
- Screencasting.
- On-line quizzes.
- Active Learning Classroom.

In addition, depending on the course modules you are involved in/will develop and the corresponding needs, please fill in the additional tables related to:

- Nuclear-specific simulation software.
- General purpose coding software.
- Laboratory exercises.

In case you need a tool not fitting in any of the category above, please fill in the table “Other tool” found at the end of the document.

In case you need to use several tools within a given category listed above, please replicate the necessary table(s) and fill them in.

Learning Management System (LMS)

Do you have access to an LMS?	Yes
If yes:	
Which one?	“Portale della didattica” (in-house developed, available in Italian, not sure it can be switched into English)
Is this LMS administered by your organization?	Yes
Could access to this LMS be granted to the partners of the consortium with “teacher rights”?	Yes, under some constraints: <ul style="list-style-type: none"> - The teaching module is to be identified officially by PoliTO (requires approval of the PhD board) - The teachers not PoliTO employee must be given guest PoliTO credentials, and then are added as part of the teaching staff of the module
Does this platform provide learning analytics data?	Yes Platform allows to exchange material with students and communicate (mail, text, forum) There is a direct link to MOODLE (see following table) for what regards the exam.
If yes, can the data be gathered: <ul style="list-style-type: none"> • Individually (i.e. at the student level): • Collectively: 	Yes Yes
How would you rate this LMS?	Good for the intended purposes, the capabilities to use it for remote teaching and remote exam have been developed very recently
Please provide any additional comment, if need be:	

Learning Management System (LMS)

Do you have access to an LMS?	Yes
If yes:	
Which one?	MOODLE
Is this LMS administered by your organization?	Yes
Could access to this LMS be granted to the partners of the consortium with “teacher rights”?	Yes, with the same constraints as the previous LMS, as MOODLE is implemented as an “add-on” to the “Portale della didattica”
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none"> • Individually (i.e. at the student level): • Collectively: 	Yes Yes
How would you rate this LMS?	Good for delivering final exams remotely (used in the last 9 months)
Please provide any additional comment, if need be:	As aid, MOODLE is implemented as an “add-on” to the LMS that was previously developed internally at PoliTO (Portale della didattica). The objective was to exploit MOODLE capabilities in terms of generating quizzes to carried out the final exam remotely, it is possible to use the same capabilities also for exercises during the course, but no other potential applications of MOODLE have been implemented.

Recording studio

Do you have access to a recording studio (for recording video lectures)?	Yes
If yes:	
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	<ul style="list-style-type: none"> - Virtual set (green screen) - Possible to have slide show in the background - Digital direction
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	<p>Doble recording set with:</p> <ul style="list-style-type: none"> - American stage lighting - Multicamera direction - Teleprompter - virtual studio - digital post-production - After effects - Da Vinci resolve - Premiere
If available, please provide links to examples of past recordings:	https://www.youtube.com/c/PolitecnicodiTorinoChannel/videos
Do you need to pay a fee for using this studio?	Yes
If yes, please describe the pricing system:	Since the studio is internal to PoliTO, the price (bulk evaluation) is paid in terms of an internal found transfer towards the studio (no invoice, no timesheet). In alternative, the studio personnel can be reported on the timesheet, but it is in general more expensive
Does your organization provide support for using this studio and for post-processing the recordings?	Yes, for a fee related to the amount of work associated. The person in charge of the recording studio illustrated the various approaches that can be adopted, starting from a simple post-processing of recording performed by the individual, to a full stage management (video, animation, use of teleprompter, post processing), which of course is extremely time consuming.
Could the other partners of the consortium use this recording studio?	No in general, in the sense that no external institution can use it, not completely clear if the co-participation of PoliTO and external personnel can be considered as valid.
If yes, would the other partners need to pay a fee for using the studio?	Yes, if the compromise case described above is valid, in which case the general comment on the payment applies.
If yes, please	

<p>describe the pricing system:</p>	
<p>Please provide any additional comment, if need be:</p>	<p>The studio is working for PoliTO to support all dissemination activities for the institution and for single research groups. Different types of recording approaches can be identified, all associated to a different cost, that can have very large variation (at least one order of magnitude)</p>

Screencasting

Do you have access to a screencasting software?	Yes
If yes:	
Which one?	Big Blue Button
Is this screencasting software administered by your organization?	Yes, BBB is the software that has been integrated in our LMS to carry out the remote/hybrid teaching during the last 2 semesters
Could the other partners of the consortium use this screencasting software free of charge?	Yes, the software is open source, and is the web-conferencing/screencasting software used for teaching
Does this screencasting software contain basic post-editing capabilities?	Yes, but the post processing of all recordings is carried out by PoliTO IT area in a centralized (and optimized) way (producing mp4 files that can be downloaded by the students), without requesting any additional effort for the single teacher
How would you rate the screencasting software?	Somewhat good, there are sometimes stability issues but they have been resolved lately.
Please provide any additional comment, if need be:	

On-line quizzes

Do you have access to a web-based platform for online quizzes?	Yes
If yes:	
Which one?	MOODLE
Is this platform administered by your organization?	Yes As mentioned in the LMS section, MOODLE is implemented into the “Portale della didattica” and is used for the generation of quizzes (for exercises during the courses and for the final exams)
Could the other partners of the consortium use this platform free of charge?	Yes, with the same constraints described in the LMS section
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes Yes
How would you rate the platform?	Good
Please provide any additional comment, if need be:	

Active Learning Classroom (ALC)

Do you have access to an Active Learning Classroom?	Almost Yes
If yes:	
Could you describe as precisely as possible the capabilities of this room (e.g. moveable furniture, collaborative learning equipment – screens/whiteboards, computer screens/TV screens, digital boards, etc.):	<p>A subset of the lecture rooms at PoliTO have been equipped to perform hybrid lectures:</p> <ul style="list-style-type: none"> - camera pointing at the teacher’s podium - podium pc and connections for personal devices (e.g. laptop) - recording through BBB <p>The desks for students are fixed, all provided with electrical socket, but no additional electronic equipment is present</p>
Can this room be used for distant learning as well?	Yes
If yes, please describe as precisely as possible the equipment in the room allowing interacting with the remote students:	The remote students can be allowed to use their microphone and webcam, which will be projected on the main screen behind the teacher
If available, please provide links describing the set-up and/or showing the capabilities of the room:	
Do you need to pay a fee for using this room?	In general No if the activities are “institutional”, which typically included activities of EC projects. Conditions may change though.
If yes, please describe the pricing system:	
Does your organization provide support for using this room?	Yes
Could the other partners of the consortium use this room?	Yes, with the constraints illustrated in the LMS table (the teacher should be officially part of the staff of a PoliTO course)
If yes, would the other partners need to pay a fee for using the room?	No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Active Learning Classroom (ALC)

Do you have access to an Active Learning Classroom?	Yes
If yes:	
Could you describe as precisely as possible the capabilities of this room (e.g. moveable furniture, collaborative learning equipment – screens/whiteboards, computer screens/TV screens, digital boards, etc.):	The DENERG department has a multimedia room, originally devised for meeting, which could serve the purpose. It is equipped with hardware and software for remote connections, desk microphones and white screen. There is a single, large table fitting 15-20 people with electrical sockets.
Can this room be used for distant learning as well?	Yes
If yes, please describe as precisely as possible the equipment in the room allowing interacting with the remote students:	The remote students can be allowed to use their microphone and webcam, which will be projected on the white screen
If available, please provide links describing the set-up and/or showing the capabilities of the room:	
Do you need to pay a fee for using this room?	No if the activities are “institutional”, which typically included activities of EC projects.
If yes, please describe the pricing system:	
Does your organization provide support for using this room?	Yes
Could the other partners of the consortium use this room?	No, as the room is managed by the department.
If yes, would the other partners need to pay a fee for using the room?	No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

General purpose coding software

Which general purpose software do you need, if any?	MATLAB/OCTAVE
Please indicate in which tasks you need to use this software:	These software, which are very similar, can be used as calculation support for the solution of simple transport problems.
Please describe the type of license associated to this software:	OCTAVE is free and can constitute a substitute for MATLAB, although most higher education Institutions have a campus licence for MATLAB.
What kind of agreement is required for the students to use this software?	See above
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	Download is necessary, however a web-based version of both software exist: <ul style="list-style-type: none"> - https://octave-online.net/ - https://matlab.mathworks.com/ (registration required)
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	No
Is there any restriction for using the software based on the students' citizenship?	Not that I know of
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes
If yes:	
Please describe the required training and its extent:	Basic knowledge in matrix calculations and standard coding (C, Fortran,...) can be easily transferred into MATLAB/OCTAVE
Can this training be provided in advance to the students?	No, we expect the students to be able to deal with this level complication independently
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Inventory - UPM

As part of Task 1.5, an inventory of the available “tools” needed to carry out the project needs to be performed. The inventory should include all aspects allowing a proper execution of the project. Please fill in the tables concerning the following points:

- Learning Management System.
- Recording studio.
- Screencasting.
- On-line quizzes.
- Active Learning Classroom.

In addition, depending on the course modules you are involved in/will develop and the corresponding needs, please fill in the additional tables related to:

- Nuclear-specific simulation software.
- General purpose coding software.
- Laboratory exercises.

In case you need a tool not fitting in any of the category above, please fill in the table “Other tool” found at the end of the document.

In case you need to use several tools within a given category listed above, please replicate the necessary table(s) and fill them in.

Learning Management System (LMS)

Do you have access to an LMS?	Yes
If yes:	
Which one?	Moodle
Is this LMS administered by your organization?	Yes
Could access to this LMS be granted to the partners of the consortium with “teacher rights”?	No
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	
How would you rate this LMS?	very good
Please provide any additional comment, if need be:	

Recording studio

Do you have access to a recording studio (for recording video lectures)?	Yes
If yes:	
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	Availability of green screen Possibility to embed slides Not necessary video post-production
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	
If available, please provide links to examples of past recordings:	
Do you need to pay a fee for using this studio?	No
If yes, please describe the pricing system:	
Does your organization provide support for using this studio and for post-processing the recordings?	No
Could the other partners of the consortium use this recording studio?	No
If yes, would the other partners need to pay a fee for using the studio?	-
If yes, please describe the pricing system:	-
Please provide any additional comment, if need be:	

Screencasting

Do you have access to a screencasting software?	Yes/No
If yes:	
Which one?	OBS Studio (Free version)
Is this screencasting software administered by your organization?	No
Could the other partners of the consortium use this screencasting software free of charge?	-
Does this screencasting software contain basic post-editing capabilities?	-
How would you rate the screencasting software?	-
Please provide any additional comment, if need be:	

On-line quizzes

Do you have access to a web-based platform for online quizzes?	Yes
If yes:	
Which one?	Moodle, Kahoot, Socrative
Is this platform administered by your organization?	Yes (moodle)/No (others)
Could the other partners of the consortium use this platform free of charge?	No
Does this platform provide learning analytics data?	Yes (Moodle)
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes No
How would you rate the platform?	somewhat good
Please provide any additional comment, if need be:	

Active Learning Classroom (ALC)

Do you have access to an Active Learning Classroom?	Yes
If yes:	
Could you describe as precisely as possible the capabilities of this room (e.g. moveable furniture, collaborative learning equipment – screens/whiteboards, computer screens/TV screens, digital boards, etc.):	Moveable furniture Computers and computer screens/TV screens Projection system Whiteboards
Can this room be used for distant learning as well?	No
If yes, please describe as precisely as possible the equipment in the room allowing interacting with the remote students:	
If available, please provide links describing the set-up and/or showing the capabilities of the room:	
Do you need to pay a fee for using this room?	No
If yes, please describe the pricing system:	
Does your organization provide support for using this room?	No
Could the other partners of the consortium use this room?	No
If yes, would the other partners need to pay a fee for using the room?	-
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	This room can be only used if no official degrees teaching is being booked

Nuclear-specific simulation software

Which nuclear-specific simulation software do you need, if any?	<p>Open Source Software</p> <ul style="list-style-type: none"> • NJOY2016 (GitHub - njoy/NJOY2016: Nuclear data processing with legacy NJOY) • PREPRO2019 (https://www-nds.iaea.org/public/endl/prepro/) • ENDF Utility Codes (https://www-nds.iaea.org/public/endl/) <p>Software distributed free of charge:</p> <p>1) Developed by IAEA/NDS:</p> <ul style="list-style-type: none"> • EXFOR Web database retrieval system (https://www-nds.iaea.org/exfor/) <p>2) Developed by the OECD/NEA</p> <ul style="list-style-type: none"> • JANIS (https://www.oecd-nea.org/jcms/pl_39910/janis) • DICE (https://www.oecd-nea.org/jcms/pl_20293/database-for-icsbep-dice) <p>NDAST (https://www.oecd-nea.org/jcms/pl_32450/nuclear-data-sensitivity-tool-ndast)</p>
Please indicate in which tasks you need to use this software:	Task2.1
Please describe the type of license associated to this software:	None
What kind of agreement is required for the students to use this software?	None
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	<ul style="list-style-type: none"> • IAEA and OECD software using any browser and JAVA installed • Precompiled software (NJOY/PREPRO/ENDF Utilities) executed locally
In case the students need to download and install the software, what are the requirements in terms of:	<p>Operative systems: Win/Mac/Linux</p> <p>CPU:</p> <p>RAM:</p> <p>Disk space:</p> <p>Other software to run the tool: JAVA</p>
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	-
Is there any restriction for using the software based on the students' citizenship?	No
If yes, which nationalities are forbidden to use the software:	-
Is any training required to use the software:	No
If yes:	
Please describe the required training and its extent:	-
Can this training be provided in advance to the students?	-
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	-

Please provide any additional comment, if need be:

UPM will use SEANAP and COBAYA systems to develop the class materials but it will not be used by the students

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General purpose coding software

Which general purpose software do you need, if any?	None
Please indicate in which tasks you need to use this software:	
Please describe the type of license associated to this software:	
What kind of agreement is required for the students to use this software?	
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Yes/No
Is there any restriction for using the software based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Laboratory exercises

Which facility/laboratory do you need, if any?	None
Please indicate in which tasks you need to use this facility/laboratory:	
Is there any restriction for using the facility/laboratory based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the facility/laboratory:	
Is any training required to access/use the facility/laboratory:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Can the exercise:	
<ul style="list-style-type: none"> • Be offered entirely on-site: 	Yes/No
<ul style="list-style-type: none"> • Be offered in a hybrid set-up, i.e. with some students on-site and some students off-site: 	Yes/No
<ul style="list-style-type: none"> • Be offered entirely off-site (i.e. on the web): 	Yes/No
In case the exercise can be offered to remote students, what set-up is possible:	
<ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>without</i> remote handling by the off-site students: 	Possible/Not possible
<ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>with</i> remote handling by the off-site students: 	Possible/Not possible
<ul style="list-style-type: none"> • Fully virtual exercise mimicking the actual exercise: 	Possible/Not possible
<ul style="list-style-type: none"> • Other set-up? 	Please describe
Please provide any additional comment, if need be:	

Other tool

Which other tool do you need, if any?	None
Please indicate in which tasks you need to use this tool:	
Please describe the tool:	
Can the tool be used by remote students?	Yes/No
How will the students access the tool?	
Is there any restriction for using the tool based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the tool:	
Is any training required to use the tool:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Inventory - UPV

As part of Task 1.5, an inventory of the available “tools” needed to carry out the project needs to be performed. The inventory should include all aspects allowing a proper execution of the project. Please fill in the tables concerning the following points:

- Learning Management System.
- Recording studio.
- Screencasting.
- On-line quizzes.
- Active Learning Classroom.

In addition, depending on the course modules you are involved in/will develop and the corresponding needs, please fill in the additional tables related to:

- Nuclear-specific simulation software.
- General purpose coding software.
- Laboratory exercises.

In case you need a tool not fitting in any of the category above, please fill in the table “Other tool” found at the end of the document.

In case you need to use several tools within a given category listed above, please replicate the necessary table(s) and fill them in.

Learning Management System (LMS)

Do you have access to an LMS?	Yes
If yes:	
Which one?	Sakai and OpenedX
Is this LMS administered by your organization?	Yes (both)
Could access to this LMS be granted to the partners of the consortium with “teacher rights”?	Yes
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Limited Yes
How would you rate this LMS?	good/very good
Please provide any additional comment, if need be:	We have Sakai, an open edX instance managed by the University and we are members of edx.org, in edX.org the University is not administering the LMS

Recording studio

Do you have access to a recording studio (for recording video lectures)?	Yes
If yes:	
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	We have one traditional big studio with green screen and 3 small studios that we call Polimedia that can be used to create HD educational videos very easily. Teachers can use Slides and software demonstration, write on a tablet or use a ceiling camera.
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	https://www.youtube.com/watch?v=-n7ODDK76WI
If available, please provide links to examples of past recordings:	https://www.youtube.com/c/UPV/videos
Do you need to pay a fee for using this studio?	No
If yes, please describe the pricing system:	
Does your organization provide support for using this studio and for post-processing the recordings?	Yes to use the studio, No for postprocessing (no postprocessing is done)
Could the other partners of the consortium use this recording studio?	Yes
If yes, would the other partners need to pay a fee for using the studio?	Yes
If yes, please describe the pricing system:	300€ per hour of recording studio
Please provide any additional comment, if need be:	The video or videos that you get from the studios are completely finished. In 1 hour of studio you can get 20 to 35 minutes of short videos if the teacher is used to the studio.

Screencasting

Do you have access to a screencasting software?	Yes
If yes:	
Which one?	Studio.opencast.org
Is this screencasting software administered by your organization?	Yes and No
Could the other partners of the consortium use this screencasting software free of charge?	Yes
Does this screencasting software contain basic post-editing capabilities?	No
How would you rate the screencasting software?	somewhat good
Please provide any additional comment, if need be:	<p>We have an internal version of the software that is only for teachers of UPV but there is an open version in the url provided. We also use open source software obs studio (https://obsproject.com/es/download) and have a guide on how to configure it for screencasting (in Spanish). Some of our teachers are using https://www.apowersoft.com/record-all-screen that costs 40\$ and is quite easy to use. We have a recommendation guide on how to configure the system, which microphone to use for our teachers (we recommend https://www.amazon.es/Micr%C3%B3fono-Seacue-Omnidireccional-Condensador-Entrevistas/dp/B071171DBP), etc</p>

On-line quizzes

Do you have access to a web-based platform for online quizzes?	Yes*
If yes:	
Which one?	Integrated in our lms sakai and opened. We also have an instance of the opensource survey software Limesurvey
Is this platform administered by your organization?	Yes
Could the other partners of the consortium use this platform free of charge?	Yes for the quizzes integrated in the openedX and sakai courses if made jointly. No for the Limesurvey
Does this platform provide learning analytics data?	Yes
If yes, can the data be gathered: <ul style="list-style-type: none">• Individually (i.e. at the student level):• Collectively:	Yes (Limesurvey) Yes
How would you rate the platform?	very good
Please provide any additional comment, if need be:	

Active Learning Classroom (ALC)

Do you have access to an Active Learning Classroom?	Yes
<p>If yes:</p> <p>Could you describe as precisely as possible the capabilities of this room (e.g. moveable furniture, collaborative learning equipment – screens/whiteboards, computer screens/TV screens, digital boards, etc.):</p>	<p>All rooms have modular tables to organize work groups.</p> <p>An Extron touch control system that allows:</p> <p>Select the video signal from the teacher's computer or the one from a guest's laptop.</p> <p>Raise or lower the projection screen</p> <p>Raise or lower the window blinds.</p> <p>Turn off or on the lighting in the room.</p> <p>A projection system connected to the teacher's computer, video projector, microphones, room speakers and a Wacom pen display connected to the teacher's computer to work precisely directly on the screen as if you were doing it on a traditional white board.</p>
Can this room be used for distant learning as well?	Yes
<p>If yes, please describe as precisely as possible the equipment in the room allowing interacting with the remote students:</p>	<p>We have an online training and collaboration system that we call "poli[Conecta]". Each room has a camera, a room microphone, a Wacom pen display connected to the teacher's computer to precisely work directly on the screen as if you were working on a traditional whiteboard.</p> <p>We have virtual rooms that provide synchronous learning sessions. Each physical room can be connected to its corresponding virtual room to interact with remote students and currently the virtual room allows to organize dynamic work groups with remote students. The virtual room system is based on Adobe Connect technology.</p>

If available, please provide links describing the set-up and/or showing the capabilities of the room:	http://oa.upv.es/Sistema-Policonecta.pdf
Do you need to pay a fee for using this room?	No
If yes, please describe the pricing system:	
Does your organization provide support for using this room?	Yes
Could the other partners of the consortium use this room?	Yes
If yes, would the other partners need to pay a fee for using the room?	Yes
If yes, please describe the pricing system:	Price rates to consult.
Please provide any additional comment, if need be:	With Adobe Connect technology it is possible to record sessions.

Nuclear-specific simulation software

Which nuclear-specific simulation software do you need, if any?	TRACE, TRACB, PARCS, SERPENT, SCALE, VALKIN, COBRA, FEMFUSION
Please indicate in which tasks you need to use this software:	WP4 – WP5
Please describe the type of license associated to this software:	TRACE, RELAP and PARCS depend on NRC. SCALE is from OAK-RIDGE TRACB, VALKIN and COBRA depend on UPV. SERPENT and FEMFUSION are open source
What kind of agreement is required for the students to use this software?	None
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	They login in the server hosted by UPV
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Yes
Is there any restriction for using the software based on the students' citizenship?	NONE for the OECD members
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	Special recorded lectures
Please provide any additional comment, if need be:	

General purpose coding software

Which general purpose software do you need, if any?	MATLAB, MICROSOFT, LINUX, INTEL FORTRAN, GNU FORTRAN AND C++
Please indicate in which tasks you need to use this software:	WP4 – WP5
Please describe the type of license associated to this software:	LINUX, INTEL and GNU compilers are open source. UPV has a license for all MICROSOFT software and also for MATLAB.
What kind of agreement is required for the students to use this software?	none
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	no
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Yes
Is there any restriction for using the software based on the students' citizenship?	No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Laboratory exercises

Which facility/laboratory do you need, if any?	Yes/No
Please indicate in which tasks you need to use this facility/laboratory:	
Is there any restriction for using the facility/laboratory based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the facility/laboratory:	
Is any training required to access/use the facility/laboratory:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Can the exercise:	
<ul style="list-style-type: none"> • Be offered entirely on-site: 	Yes/No
<ul style="list-style-type: none"> • Be offered in a hybrid set-up, i.e. with some students on-site and some students off-site: 	Yes/No
<ul style="list-style-type: none"> • Be offered entirely off-site (i.e. on the web): 	Yes/No
In case the exercise can be offered to remote students, what set-up is possible:	
<ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>without</i> remote handling by the off-site students: 	Possible/Not possible
<ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>with</i> remote handling by the off-site students: 	Possible/Not possible
<ul style="list-style-type: none"> • Fully virtual exercise mimicking the actual exercise: 	Possible/Not possible
<ul style="list-style-type: none"> • Other set-up? 	Please describe
Please provide any additional comment, if need be:	

Other tool

Which other tool do you need, if any?	
Please indicate in which tasks you need to use this tool:	
Please describe the tool:	
Can the tool be used by remote students?	Yes/No
How will the students access the tool?	
Is there any restriction for using the tool based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the tool:	
Is any training required to use the tool:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Inventory - ENEN

As part of Task 1.5, an inventory of the available “tools” needed to carry out the project needs to be performed. The inventory should include all aspects allowing a proper execution of the project. Please fill in the tables concerning the following points:

- Learning Management System.
- Recording studio.
- Screencasting.
- On-line quizzes.
- Active Learning Classroom.

In addition, depending on the course modules you are involved in/will develop and the corresponding needs, please fill in the additional tables related to:

- Nuclear-specific simulation software.
- General purpose coding software.
- Laboratory exercises.

In case you need a tool not fitting in any of the category above, please fill in the table “Other tool” found at the end of the document.

In case you need to use several tools within a given category listed above, please replicate the necessary table(s) and fill them in.

Learning Management System (LMS)

Do you have access to an LMS?	Soon to be implemented
If yes:	
Which one?	MOODLE
Is this LMS administered by your organization?	Yes/ No
Could access to this LMS be granted to the partners of the consortium with “teacher rights”?	Yes/ No
Does this platform provide learning analytics data?	-
If yes, can the data be gathered: <ul style="list-style-type: none"> • Individually (i.e. at the student level): • Collectively: 	-
How would you rate this LMS?	Not good at all/somewhat not good/neither bad, nor good/somewhat good/very good
Please provide any additional comment, if need be:	Largely used tool. Additionally we well informed of LMS software used and developed by Members of our Network.

Recording studio

Do you have access to a recording studio (for recording video lectures)?	No
If yes:	
Could you describe as precisely as possible the capabilities of this studio (e.g. availability of a green screen, possibility to write on a transparent glass, possibility to embed slides, etc.):	
If available, please provide links describing the set-up and/or showing the capabilities of the studio:	
If available, please provide links to examples of past recordings:	
Do you need to pay a fee for using this studio?	Yes/No
If yes, please describe the pricing system:	
Does your organization provide support for using this studio and for post-processing the recordings?	Yes/No
Could the other partners of the consortium use this recording studio?	Yes/No
If yes, would the other partners need to pay a fee for using the studio?	Yes/No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Screencasting

Do you have access to a screencasting software?	No
If yes:	
Which one?	
Is this screencasting software administered by your organization?	Yes/No
Could the other partners of the consortium use this screencasting software free of charge?	Yes/No
Does this screencasting software contain basic post-editing capabilities?	Yes/No
How would you rate the screencasting software?	Not good at all/somewhat not good/neither bad, nor good/somewhat good/very good
Please provide any additional comment, if need be:	

On-line quizzes

Do you have access to a web-based platform for online quizzes?	Not yet-it is foreseen to be implemented with MOODLE
If yes:	
Which one?	MOODLE based
Is this platform administered by your organization?	Yes/No
Could the other partners of the consortium use this platform free of charge?	Yes/No
Does this platform provide learning analytics data?	-
If yes, can the data be gathered: <ul style="list-style-type: none"> • Individually (i.e. at the student level): • Collectively: 	-
How would you rate the platform?	Not good at all/somewhat not good/neither bad, nor good/somewhat good/very good
Please provide any additional comment, if need be:	Additionally, we have knowledge on on-line quiz tools (and associated algorithms) developed by our Members.

Active Learning Classroom (ALC)

Do you have access to an Active Learning Classroom?	No
If yes:	
Could you describe as precisely as possible the capabilities of this room (e.g. moveable furniture, collaborative learning equipment – screens/whiteboards, computer screens/TV screens, digital boards, etc.):	
Can this room be used for distant learning as well?	Yes/No
If yes, please describe as precisely as possible the equipment in the room allowing interacting with the remote students:	
If available, please provide links describing the set-up and/or showing the capabilities of the room:	
Do you need to pay a fee for using this room?	Yes/No
If yes, please describe the pricing system:	
Does your organization provide support for using this room?	Yes/No
Could the other partners of the consortium use this room?	Yes/No
If yes, would the other partners need to pay a fee for using the room?	Yes/No
If yes, please describe the pricing system:	
Please provide any additional comment, if need be:	

Nuclear-specific simulation software

Which nuclear-specific simulation software do you need, if any?	NONE
Please indicate in which tasks you need to use this software:	
Please describe the type of license associated to this software:	
What kind of agreement is required for the students to use this software?	
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Yes/No
Is there any restriction for using the software based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

General purpose coding software

Which general purpose software do you need, if any?	NONE
Please indicate in which tasks you need to use this software:	
Please describe the type of license associated to this software:	
What kind of agreement is required for the students to use this software?	
Do the students need to download and install the software, or can they log in to a server hosted by your organization for using the software?	
In case the students need to download and install the software, what are the requirements in terms of:	Operative systems: CPU: RAM: Disk space: Other software to run the tool:
In case the students need to log in to a server, can remote students use this software (i.e. without being physically present on the premises of your organization)?	Yes/No
Is there any restriction for using the software based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the software:	
Is any training required to use the software:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	

Laboratory exercises

Which facility/laboratory do you need, if any?	NONE
Please indicate in which tasks you need to use this facility/laboratory:	
Is there any restriction for using the facility/laboratory based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the facility/laboratory:	
Is any training required to access/use the facility/laboratory:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Can the exercise:	
<ul style="list-style-type: none"> • Be offered entirely on-site: 	Yes/No
<ul style="list-style-type: none"> • Be offered in a hybrid set-up, i.e. with some students on-site and some students off-site: 	Yes/No
<ul style="list-style-type: none"> • Be offered entirely off-site (i.e. on the web): 	Yes/No
In case the exercise can be offered to remote students, what set-up is possible:	
<ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>without</i> remote handling by the off-site students: 	Possible/Not possible
<ul style="list-style-type: none"> • Sharing of audio/video/digital contents of the actual exercise in real time <i>with</i> remote handling by the off-site students: 	Possible/Not possible
<ul style="list-style-type: none"> • Fully virtual exercise mimicking the actual exercise: 	Possible/Not possible
<ul style="list-style-type: none"> • Other set-up? 	Please describe
Please provide any additional comment, if need be:	

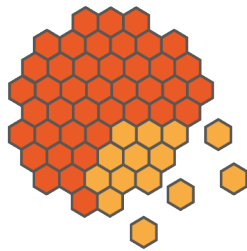
Other tool

Which other tool do you need, if any?	Only Office-based software
Please indicate in which tasks you need to use this tool:	
Please describe the tool:	
Can the tool be used by remote students?	Yes/No
How will the students access the tool?	
Is there any restriction for using the tool based on the students' citizenship?	Yes/No
If yes, which nationalities are forbidden to use the tool:	
Is any training required to use the tool:	Yes/No
If yes:	
Please describe the required training and its extent:	
Can this training be provided in advance to the students?	Yes/No
If yes, describe as precisely as possible a possible set-up (e.g. small recorded lectures, etc.):	
Please provide any additional comment, if need be:	



9. Appendix B - Overview of the inventory of the resources available to the consortium





Inventory of “tools”

WPI – Task I.5

Webmeeting, January 19th, 2021

Prof. Christophe Demazière, CHALMERS



Learning Management Systems

	CHALMERS	EPFL	TUM	TUD	BME	POLITO	UPM	UPV	ENEN
Name	Canvas	a) Moodle b) open edX	Moodle	Opal	Moodle	a) Portale della didattica (only in Italian) b) Moodle	Moodle	a) Sakai b) Open edX	Moodle (to be soon implemented)
Administered locally	✓	?	✓	✗	✓	✓	✓	✓	✓
Access to external teachers	Most likely possible, but needs to be first discussed internally	✓	✓	✓	✓	Under some conditions	✗	✓	✓
Learning analytics	✓	a) ✗ b) ✓	✓	✓	✓	a) (?) b) ✓	✓	✓	?
Student data	Both individually and collectively	?	Both individually and collectively	?	Both individually and collectively	Both individually and collectively	?	Limited at the individual level Ok at the collective level	?
Quality	++	a) + b) ?	++	--	?	+	++	+ / ++	?

Learning Management Systems

- Summary:
 - LMS + on-line quizzes: discussion about using Soul from Tecnatom or Moodle from TUM
 - Questions to be addressed:
 - Can one create courses, invite teachers and students outside of TUM for the Moodle option?
 - Price for Soul, both during the project and after its completion?
 - Learning analytics capabilities for Soul and Moodle?

Recording studio

	CHALMERS	EPFL	TUM	TUD	BME	POLITO	UPM	UPV	ENEN
Name	a) Studio Decibel b) Faraday ALC studio c) Blended Learning studio	Available, but unclear at this point about the capabilities and conditions for use	Available, but unclear at this point about the capabilities and conditions for use	Available	×	Available	Available	Available	None
Equipment	a, b and c) Green screen + mics + cams + additional monitors For b) transparent glass on which one can write	?	?	Digital white board, slide/screen sharing, stream of video data		Green screen + mics + cams + teleprompter	Green screen + slides + no need of post-production	Green screen or small studio + slides + software demonstration + Tablet to write + ceiling cam	
Fee to be paid by internal users	a) 12 kSEK (+VAT) per booking + studio room rate (ca. 2.9 kSEK/day) b) No cost for a few bookings c) Studio currently not planned to be used for anything else than for Chalmers regular education	Yes	No	No		Yes (internal payment or time reporting for the technicians)	No	No	
Support for using the studio and for post-processing	a) ✓ b) × c) ✓	✓ (+ self-paces course about how to produce courses)	✓	✓		✓	×	✓ (no post-processing required)	
Access to external teachers	a) ✓ b) Need to be discussed c) Studio currently not planned to be used for anything else than for Chalmers regular education	?	?	×		× (but could work if co-participation of Polito academic staff)	×	✓	
Fee to be paid by external users	a) 12 kSEK (+VAT) per booking + studio room rate (ca. 4.8 kSEK/day)	?	?					300 EUR/hour of recording studio	

Recording studio

- Summary:
 - Two realistic alternatives: Studio Decibel at Chalmers + studio at UPV
 - Questions to be addressed:
 - None
 - Additional remark: Chalmers has also access to the Faraday ALC studio (University of Gothenburg) – equipped with a transparent glass for writing

Screencasting

	CHALMERS	EPFL	TUM	TUD	BME	POLITO	UPM	UPV	ENEN
Name	a) Kaltura Desktop b) Camtasia	?	a) Camtasia b) CamStudio c) OBS Studio	a) Gotomeeting b) Bibluebutton	a) OBS Studio b) Zoom	Big Blue Button	OBS Studio	Studio.opencast.org (+ Obs Studio + ApowerREC – not detailed hereafter)	None
Administered locally	a) ✓ b) ✗		a) ✓ b) ✗ c) ✗	a) ✗ b) ✓	a) ✗ (individual use) b) ✓	✓	✗	?	
Access to external teachers free of charge	a) ? b) ✗		a) ? b) ✓ c) ✓	✗	a) ✓ (free-ware) b) ✗	✓	?	✓	
Basic post-editing possibilities	a) ✓ b) ✓		✓	✗	✗	✓	?	✗	
Quality	a) + b) ?		a) ++ b) + c) +	+	+	+	?	+	

Screencasting

- Summary:
 - Use of in-house solutions by each partner
 - Questions to be addressed:
 - None

On-line quizzes

	CHALMERS	EPFL	TUM	TUD	BME	POLITO	UPM	UPV	ENEN
Name	Canvas	a) Moodle b) open edX	Moodle	OPAL	a) Kahoot b) MS Forms c) Moodle	Moodle	a) Moodle b) Kahoot c) Socrative	a) Sakai b) Open edX c) Limesurvey	Moodle (to be soon implemented)
Administered locally	✓	?	✓	✗	a) ✗ b) ✓ c) ✓	✓	a) ✓ b) ✗ c) ✗	✓	✓
Access to external teachers free of charge	Most likely possible, but needs to be first discussed internally	✓	?	✓	a) ✗ b) ✗ c) ✓	Under some conditions	✗	a) ✓ b) ✓ c) ✗	✓
Learning analytics	✓	a) ✗ b) ✓	✓	✓	a) ✓ b) ✓ c) ✓	✓	a) ✓ b) ✗ c) ✗	✓	?
Student data	Both individually and collectively	?	Both individually and collectively	Both individually and collectively	Both individually and collectively	Both individually and collectively	a) Individually but not collectively	Individually for c) Collectively	?
Quality	?	a) ? b) ?	++	+	a) + b) - c) ++	+	+	++	++

On-line quizzes

- Summary:
 - Use of the LMS
 - Questions to be addressed:
 - None

Active Learning Classroom

	CHALMERS	EPFL	TUM	TUD	BME	POLITO	UPM	UPV	ENEN
Name	✓	?	✗	✗	✗	a) ✓ (almost) b) Multimedia meeting room	✓	✓	✗
Equipment	Moveable furniture, whiteboards, on-site attendance limited to 25 persons (15 ideal) + mics/loudspeakers + webcams + podium Tablet pc					a) No movable furniture + cam + podium PC + recording through BBB b) Hardware and software for remote connection + mics + white screen, limited to 15-20 persons	Moveable furniture, whiteboards, computers and computer screens/TV screens, projection system	Movable furniture, projection system, mics/loudspeakers + Wacom tablet	
Distant learning capabilities	Screen sharing + audio sharing + video sharing					a) Audio sharing + video sharing b) Screen sharing + audio sharing + video sharing	✗ (maybe remote teaching possibilities will be available soon as a result of Covid-19)	✓ + virtual rooms based on Adobe Connect	
Fee to be paid by internal users	No					a) No (but conditions may vary) b) No (but conditions may vary)	No	No	
Support for using the ALC	✗					✓	✗	✓	
Access to external teachers	✓					a) Under some conditions b) ✗	✗	✓	
Fee to be paid by external users	No					No		To be discussed	

Active Learning Classroom

- Summary:
 - Use of ALC in a hybrid set-up provided by Chalmers and UPV
 - Questions to be addressed:
 - Can the UPM ALC room also be used in a hybrid set-up?

Nuclear-specific simulation software

	CHALMERS	EPFL	TUM	TUD	BME	POLITO	UPM	UPV	ENEN
Name	CASMO-4/SIMULATE-3	GeN-Foam	ATHLET, PARCS, DYN3D	Serpent	a) Serpent b) OpenMC (backup solution)	-	a) NJOY2016, PREPRO2019, ENDF Utility Codes b) EXFOR, JANIS, DICE, NDAST	a) TRACE, PARCS b) SCALE c) SERPENT d) TRACB, VALKIN, COBRA e) FEMFUSION	-
Task	4.3 + 8.2	4.3 + 4.4 + 5.4	6.2	4.3 + 4.4	2.2 + 3.2 + 4.3 + 4.4 + 5.4 + 6.2 + 7.3		2.1	4.4 + 5.4	
License	Commercial (+ university)	GNU GPL v3	Free for educational purpose	Free for non-commercial research and education	a) OECD/NEA site-license b) Open source		a) Open source software b) Free of charge software	a) NRC license b) Oak Ridge license c) Free for commercial research and education d) UPV license e) Open source	
Agreement for students to use the software	None (but restrictions may apply)	None	Need to register for the course or write a thesis in the institute	Each student needs to obtain a license?	a) Work on-site? b) Not required		None	None?	
Access to students	Remote access being discussed (but restrictions may apply)	Download and install	Remote access but need to be physically present on the premises	Access on site only?	a + b) Log in to server (download is also possible) Access to remote students: a) Yes b) May be problematic from abroad (especially outside of EU)		Web-browser based software and software to be downloaded and installed	Remote access	
Restrictions based on citizenship	?	No	No	No?	No?		No	None for OECD members	
Prior training required	No	Recommended	Recommended	No	Yes		No	Yes (via pre-recorded lectures)	

Nuclear-specific simulation software

- Summary:
 - Questions to be addressed:
 - Access for students not formally enrolled at the partner organization
 - Remote access
 - Limitations due to citizenship
 - Remarks:
 - GeN-Foam (open-source) available from EPFL, if need be
 - Studsvik Sandpower willing to make some of its tools remotely available against payment during the times the tools are needed

General purpose coding software

	CHALMERS	EPFL	TUM	TUD	BME	POLITO	UPM	UPV	ENEN
Name	Matlab Grader	-	a) Python 3.8 b) Octave c) Matlab	C++, Matlab, Python	Matlab	a) Matlab b) Octave	-	a) Matlab b) Microsoft c) Linux, Intel Fortran and GNU Fortran and C++	-
Task	T3.2 + 3.3 + 8.2 T4.3 (+ possibly 4.4) + 4.5 + 8.2 T5.4 + 5.5 + 8.2		?	?	2.2 + 3.2 + 4.3 + 4.4 + 5.4 + 6.2 + 7.3	?		4.4 + 5.4	
License	Academic license		a) Free b) Free c) Academic license	?	Academic license	a) Academic license b) Free		a) Academic license b) Site license c) Open source	
Agreement for students to use the software	None (as long as the teacher has a campus license)		a) None b) None c) Student or personal license	?	Teacher or student at BME	a) Student or personal license b) None		a) Student or personal license b) Use restricted to UPV c) None	
Access to students	Via a web-browser		Download and install recommended	?	Download and/or web-based use + remote access	Download and install, or web-browser access (need to be physically present)		Remote access	
Restrictions based on citizenship	None		None	?	None	None		None	
Prior training required	Yes (via online small courses with demo/examples/tutorials)		Yes (via online small courses with demo/examples/tutorials)	?	Yes (via online small courses with demo/examples/tutorials)	Expected knowledge from the students		None	

General purpose coding software

- Summary:
 - Matlab Grader = feasible alternative (in addition to other free coding solutions)
 - Questions to be addressed:
 - Planned use of general-purpose coding software at TUM, TUD and POLITO
 - For UPV:
 - Access for students not formally enrolled at the partner organization
 - Remote access
 - Limitations due to citizenship

Laboratory exercise

	CHALMERS	EPFL	TUM	TUD	BME	POLITO	UPM	UPV	ENEN
Name	-	CROCUS, LRS controlled zone	-	AKR-2	BME Training Reactor	-	-	-	-
Task		2.2 + 3.2 + 4.3 + 4.4 + 5.4 + 6.2 + 7.3		2.2 + 3.2 + 4.3 + 4.4 + 5.4 + 6.2 + 7.2 + 7.3	2.2 + 3.2 + 4.3 + 4.4 + 5.4 + 6.2 + 7.3				
Restrictions based on citizenship		None		Yes	Yes				
Prior training required		No (short training provided when starting the exercises)		No (short training provided when starting the exercises)	No (short training provided when starting the exercises)				
Set-up: On-site Hybrid Off-site		✓ Most likely yes Most likely yes		✓ ✓ (✓)	✓ × (or very limited) ×				
If remote set-up:									
No remote handling		✓		✓	✓ (but limited)				
Remote handling		Partly possible (but not the reactor)		✓ (being considered)	× (but software can be handled remotely)				
Virtual exercise		×		×	×				

Thank you!

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