EUROPEAN UNIVERSITY OF TECHNOLOGY

EUt+

European University of Technology

Deliverable D30

D3.2.1 Master Curricula

Del. Rel. No D3.2

WP 3

Description: Common plan for the merging (harmonization, decentralization and deconcentration) of Master curricula

Comments: Two pieces of this deliverable are common with the deliverable n°28 (3.1.1 + 3.2.1 Workshop analysis.pdf + EUT European Degree Reference Guide.pdf). They have been built to ensure pedagogical consistency between the bachelor and master.

When European Bachelors or Masters within EUt+ is mentioned, it refers to the target object of the EUt+ alliance and not to the existence of an already existing status for such degrees.

Dissemination level: PU-Public

https://www.univ-tech.eu/phase-1-results

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This initiative has received funding from the European Union's Erasmus+ programme under grant agreement 101004088 — EUt — EPP-EUR-UNIV-2020.

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EUt+

European University of Technology

Livrable 30

D3.2.1 Offre de formation niveau master

Del. Rel. No D3.2

WP 3

Description : Plan commun pour la fusion (harmonisation, décentralisation, déconcentration) des cursus master

Commentaires: Deux éléments de ce livrable sont communs avec le livrable n°28 (3.1.1 + 3.2.1 Workshop analysis.pdf + EUT European Degree Reference Guide.pdf). Ils ont été construits de manière unifiée notamment pour assurer la cohérence pédagogique entre le Bachelor et le Master.

Lorsque des Bachelors ou Masters européens sont mentionnés, il s'agit d'un objet cible pour l'alliance EUt+ et ceci ne présuppose pas un statut déjà existant.

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EUT+ PROJECT

FOREWORD TO DELIVERABLE 3.2.1

MAY 2021

This deliverable is composed of four elements, presented with their current degrees of maturity, which are continuously being explored:

1. A first roadmap on the objective and the method (D3.2.1 Master Degree in engineering - Roadmap .pdf). This document summarizes the current situation and future actions to be taken in task 3.2. In the appendix, a document presents a set of curricula that will converge (D3.2.1 Annex 1 – Master Proposal Matrix.xls - contains detailed info on each partner and the methods used to collect the information is explained in the previous document).

2. The “cluster” of actual curricula that will start converging within the first two years. (D3.2.1 First wave Masters Clusters.pdf)

3. The first version of a reference guide which is the basis to facilitate a better understanding of the initiative and should guide further work. For greater consistency in the execution of the work, we have drawn up a common guide for deliverables 3.1.1 and 3.2.1. This same guide is therefore in deliverable 3.1.1 (EUT European Degree Reference Guide.pdf).

4. The analysis of the results of a workshop we hosted for deliverables 3.1.1 and 3.2.1 which allows a measure of the degree of understanding and ownership of the project by the involved teams (D3.1.1 + D3.2.1 Workshop analysis.pdf). We thought it appropriate to bring together the reflections on deliverables 3.1.1 and 3.2.1 in this workshop to ensure coherence in the construction of the above-mentioned documents.

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EUROPEAN UNIVERSITY OF TECHNOLOGY

EUt+ Initiative

WORK PACKAGE 3:

Deliverable 3.2.1

Master Degree in engineering - Roadmap

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Content

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1. Introduction

The present report focuses on the steps taken towards the harmonization of master degrees, and on the elaboration of a common strategy to address the next activities planned in *Task 3.2 – Integrating existing master degrees from the EUt+ project proposal.* Today our eight institutions differ in many ways with regard to their educational offerings. Some disciplines and programs overlap naturally, but the detailed courses, content, calendar, evaluation, quality assurance requirements, etc. can differ notably. Heading towards a multi-campus university model, the curricula will eventually need to be aligned in content, quality, and format. This alignment is a necessary step to move towards European degrees. The features of the European degrees, the European standards and guidelines, the ENAEE requirements and what we have written in our bid is the framework defining our common point of convergence. Before entering in the detail on the work done in these last 6 months for Task 3.2 we would like to summarize the main aim of the task.

For the master's degree we plan to have at least 4 joint curricula by the end of 2023. The delivered diploma will be or one identical degree per campus, or a joint degree following national regulations. Students will be able to choose their course according to competences they have to acquire and learning outcomes, the partners they wish to visit, and the details of the offering. The very minimum mobility path is shown in Figure 1 in blue or yellow (one semester). The green and black itineraries correspond to what will be the majority in the long term. Through a competences-process and program-approach developed by all the teams in the convergent curricula group, a single competences framework will be established and shared for each Master of Engineering target curriculum. The targeted audience for this first phase is the 40% of the global number of students.

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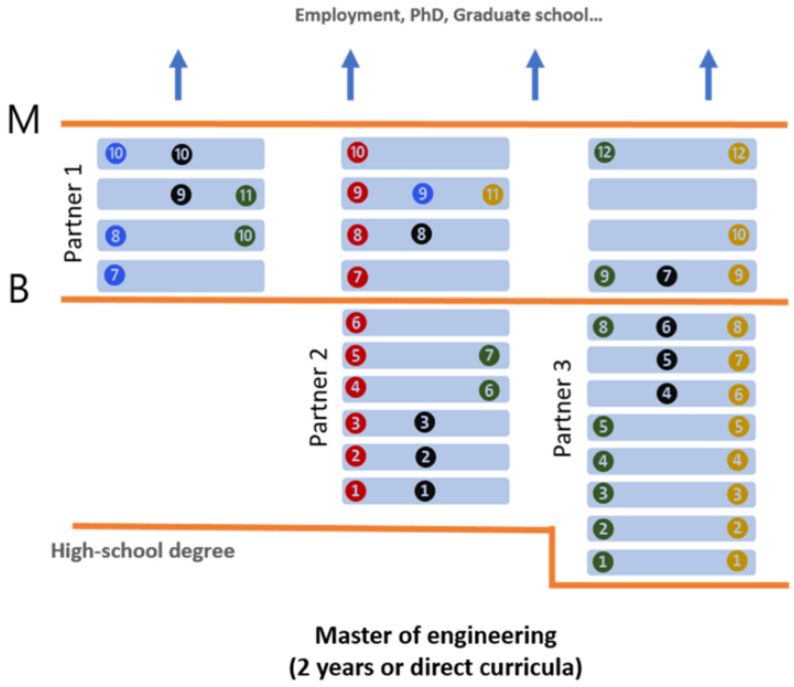

Fig. 1. Students' mobility in EUt+ Multi-Campus [*Source: EUt+ proposal*]. For the master's courses (2 years or direct), the curricula will be fully joint. As soon as the "buffer entrance" phase is passed, students are free to choose their course according to the skills they wish to acquire, the partners they wish to visit and the details of the offering. The minimum mobility path is shown in blue or yellow (one semester). The green and black itineraries correspond to what we hope will be the majority in the long term. At the end of the complete convergence process, the course in red should be an exception only for students with difficulties that do not allow them mobility (it will only give the national degree and not the European one that we are aiming for in the long term).

2. Firsts steps taken towards the integration of master degrees

From a strategic point of view, we decided to address the problem of how to go towards a multi-campus university model through a twofold approach. On one hand we worked on the appropriation of the elements structuring our EUt+ proposal and of the elements composing the future European Degree. On the other, we worked on the mapping of currently offered degrees.

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1) Appropriation of the elements structuring EUt+

Understanding and appropriation of the content of the project, and of the elements that will be structuring it, will play, in our opinion, an essential part in the success of the project.

For this reason, we decided to facilitate a global WP03 workshop to allow participants to grasp the content of the project and to "dream" of an ideal EUt+ degree structure. Forty-four people participated in the workshop. The main results of the workshop are a reinterpretation and reappropriation of the European Degree features; a first list of transversals skills required for our "ideal student"; and, finally, a list of problems and difficulties we could encounter while trying to achieve the ideal EUt+ degree structure (as well as a list of possible solutions or enablers to draw the first lines for future actions). The detailed results of the workshop are submitted as a joint document for WP03. The workshop analysis does not describe what we aim at achieving with the project. Rather, it is a snapshot of the current appropriation of the project by the involved staff, which, as explained infra, will play an essential role in the success of the project. A subpart of the results is integrated in Section 3 of this document when addressing the steps we consider to take in order to achieve a joint EUt+ degree. The complete analysis can be found in the document called *Workshop Analysis*.

2) Mapping of current offered degrees

To decide which master degrees will be involved in the pilot (first year) experimentation, we decided to move away from a top-down attitude and rely on a – mostly - bottom-up approach. Again, the concern here was the appropriation of the project by the actual actors that will be involved in the project. We thus structured the work from a larger to a smaller scale, to make the project manageable at the applicative smaller scale. Hereafter we detail the phases we went through to reduce the complexity of the task and to allow for appropriation.

I. Mapping Universities degrees

All partners Universities were asked to prepare a summative presentation of their existing diploma. This first step was taken in order to understand where there could be possible contact points from the point

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of view of the content. At this point no detailed information about each diploma was collected, in order to avoid any information overloading that nobody will be able to process as several Universities own more than 30 different masters. Tab1 of the excel file called "*master degrees- information for all partners"* shows the results of this first listing. Based on the information received, we created clusters of all the possible shared diploma (Tab2 of the excel file).

II. Identify potential master candidates for the EUt+ degree

Starting from this all-degrees mapping, each partner University was asked to have an internal discussion about the partners which held the most of interest for them. The results of this reflection were consolidated in a shared table (tab3). Fig 2 shows a small sample of the work done.

TU Cluj Napoca	UP Cartagena	HDarmstadt	TUDublin	TU Sophia	Riga TU	UT Cyprus	UT Troyes
Civil engineering	0,5	1	0,5x2		1	1	0,5
Telecommunications	1	1	1	1	1	1	1

Fig. 2. An example of interest expression by the partners.

The numbers ranging from 0 to 1 are the level of interest expressed by the partners in creating a common degree on the topic. A semi-consolidated clusters contact table was also created to allow the partners to start to contact each other (tab4).

III. Validate clusters and partners involvement

In order to compare the will of the participants with the strategic planning of the partners' Universities boards, all Universities were asked to produce a list of priorities inside the clusters. Starting from this list of priorities and from the will of each active involved actor, we created a consolidated planning for the first waves of masters which is shown in Fig. 3 and in tab5 of the excel file.

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Cluster name	UTCN	UPCT	HDA	TUDublin	TUS	RTU	CUT	UTT
European Masters degree in Civil Engineering and sustainability	Master of Science in Durable Concrete Constructions	Masters degree in Civil Engineering (Master de Ingenieria de Caminos, Canales y Puertos)		MSc in Sustainable Development + ME Sustainable Infrastructure	Technologies for utilization of renewable energy source		Civil Engineering and Sustainable Planning	
European Masters degree in Network and Telecommunication engineering	Master of Science in Telecommunications	Masters degree in Telecommunication Engineering (Master Universitario en Ingeniería de Telecomunicaciones)	Electrical Engineering and Information Technology International (Master of Science)	MSc in Electronic and Communications Engineering	Telecommunications	Master Degree of Engineering Science in Telecommunications		Networks and Telecommunication (RT)
European Masters degree in Mechanical engineering	Masters in (1) Robotics, (2) Virtual engineering and competitive manufacturing, or (3) Advanced techniques in automotive engineering	Masters degree in Industrial Engineering (Master Universitario en Ingeniería Industrial)		ME Mechanical Engineering	Mechanical Engineering / Mechatronic Systems			Mechanical Engineering (GM)

Fig.3 The list of masters and partners going in the first wave

The stabilization of a second wave is under discussion. This second wave that will start as from September will most probably consist of Computer Science, Industrial Engineering, and Material Science and Nanotechnology. Even if we will start the project with the degrees listed above, to maximize the chances of success we decided to not hinder the discussion between willing partners. Each cluster that shows an interest from 3+ partners is free to continue the discussion. Knowing that the final aim will always be to reach a joint diploma, it is worth noting that the depth of the engagement of each partner can vary. For some partners in the same cluster, the first discussions could be around shared classes and students' projects, for others, discussions will have to deal from the very beginning with a joint diploma.

3. Next steps to take towards the integration of master degrees

The core of the work we will undergo in the next months is to create and then consolidate a common plan for harmonization. The main elements we will address are detailed in the rest of this part.

The 4 C's: Curricula, Courses, Competencies, Credits

The question of courses, credits and curricula that students will follow will be a central part of the discussion both at the clusters level and at a more administrative level. By making the list of final learning outcomes of the target degree, the Universities will set their shared foundation of final learning outcomes that students must acquire whatever the foreign university they choose.

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What is thus expected in the next year is to:

1) Work towards a definition of the different degrees in clusters through to final learning outcomes

This first step is important because not all the partner Universities currently have their degrees defined through competences and learning outcomes. In cases where some Universities may not have this definition in competences and learning outcomes, more experienced partners will help to:

I. Define the set of final learning outcomes for each degree linked with EUt+ Master degree competences

II. Identify the basic learning outcomes for each existing course

III. Verify how the basic learning outcomes available with the final learning outcomes needed match

IV. Defining the teaching-learning methodology linked with the competences and the learning outcomes.

2) Work towards the definition of core shared competences and flexible pathways

A common competency framework for the Master's level was established at the moment of the creation of the project proposal - and it is the basis for convergence decisions. However, additional work is required for it to be applicative for all the partners.

From the defined competences we will reach in each cluster an agreement on what are the final learning outcomes that the degrees should have. Each student should be able to acquire them in whatever University s/he decides to join. Near to these core competences we will have job oriented/specialized competences and learning outcomes that could differ from University to University. The richness of this diversity will be exploited when creating the joint degrees. Consensus and convergence will be achieved curriculum by curriculum inside the clusters and the competences will be mapped in a cross-reference table on all the courses per cluster proposed by each University. The resulting competences will be based on European frameworks (ESG, etc.) and quality assurance schemes (ENQA, ENAEE, etc.). This work will be the basis to develop flexible pathways for student's personal learning.

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3) Work towards the integration of societal challenges in the degrees.

Civic engagement has emerged from the workshop we held as a central aspect. We will thus work on strategies for not only to the sensitize students to societal issues but also to create an active engagement to solve those issues. A work group will thus be created to discuss topics such as how to:

- **Immerse students in real life projects** and learn from the world
- **Create multi-disciplinary (interdisciplinary) situations linked to real life** so that students consider problems from different angles (law, engineering, etc.)
- **Promote outside-of-university engagement** to help student grow and mature in their European citizenship

The reflections emerging from this work group will be integrated in an iterative way in the clusters shared curricula. Depending on the proposals, they could take the form of classes or teaching methods.

4) Work towards the integration of human science in the main curricula.

In the same vein, a very strong emphasis will be placed on the Humanities and transversality in all curricula. The final learning outcomes will necessarily integrate these characteristics, which will not be juxtaposed with "techniques and hard sciences". As highlighted in the Mission Statement, increasing the place of Humanities and Social Sciences is fully in line with our motto Think Human First. We will expand the know-how of TUDublin and UTT to the rest of campuses and promote a multidisciplinary approach, whereby Humanities and Social Sciences are embedded in the technological curricula rather than being independent stand-alone courses. A working group will define the strategies to be used in an iterative way to integrate humanities in the common curricula.

5) Work towards identifying the barriers to the delivery of a single degree

While the workshop has underlined the existence of possible obstacles ranging from psychological, to financial, to legislative obstacles, a more in-depth analysis is needed to understand all of these aspects and the way to address them.

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All technical and administrative barriers will be discussed with the DGEAC and the ministries of the member states, in order to be cleared.

6) Work towards the alignment of administrative elements.

Finally, the more administrative elements will be addressed. They will range from the alignment of the calendars, to the creation of a common framework for automatic ECTS recognition, to the creation of collaboration agreements for each specialization participating in the pilot program between the partner universities. As an example, we can cite the alignment of the calendar. Right now, the start and end of semesters among the 8 universities are not matching. Overcoming this administrative misalignment is very important in order to facilitate students' mobility. On the other hand, this administrative element calls for a larger analysis of other strategic elements, as it calls also, for example, for a study of the interconnection between students' and teachers' mobility (where teachers' calendars are "longer" than the students because of teaching boards and other administrative elements).

4. Task management and quality assurance

Monthly/Weekly (depending on the needs) meetings will be organized within each work group.

The quality assurance process will take ESG as a framework reference and ENAEE as the guiding standard for our engineering training.

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CONTENT AND ANALYSIS

30TH AND 31TH MARCH WORKSHOPS

FOREWORD

The present document summarizes the content emerging from March – Tuesday 30 and Wednesday 31 – 2021 EUt+ participatory workshops. Forty-four participants took part in these two, three-hour sessions. The aim of the first part of the workshop was to appropriate the content of the project and to "dream" an ideal EUt+ degree structure. Participants were divided into five groups of 6 to 8 people with a facilitator.

The first day, each group had a discussion about the twelve features of the European degree and the skills students must acquire during their EUt+ journey. Subsequently, participants elaborated a narrative describing the life of a student during one EUt+ semester using both the features and the associated skills. As a result of this work, one merged story based on the five narratives created by each group was created.

The second day, each group was asked to focus on questions about problems and difficulties we could encounter while trying to achieve the ideal version of the project, and then listed the possible solutions or enablers to draw the first lines for future actions.

This document summarizes the content of these two half-day workshops by presenting :

1. The appropriation/adaptation of the twelve features of the European Degree with the skills associated
2. A list of problems identified from the discussion and the associated solutions
3. A synthetic view of the ideas gathered under higher-level categories

The objective of this documents is be to shared with the participants, in a way to gather feedback and ensure a common understanding of the insights that emerged that will serve as useful guidelines on which to base the future actions.

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I. EUROPEAN DEGREE FEATURES

In this section, we introduce the results of the workshops following the European Degree Features point of view.
Table 1 presents a summative view of the suggestions. The subsequent part details each item. Starting from the characteristics of the European degree allows to feed the reflection on what type of shared degree EUt+ is wishing for and aiming at. The different elements must be further discussed in the future to draw a more detailed road towards the final diploma.

SUMMATIVE VIEW OF EUROPEAN DEGREE FEATURES - TABLE 1

Embedded mobility

- Putting forward modularity and self-created learning tracks
- Need to support paths for each student
- Teaching mobility and its benefits, it is not self-evident
- Mobility must be considered over long periods to be effective and not create unnecessary carbon footprint
- Mobility concerns teachers as well as students

Multilingualism

- Culture experience matters as much as the language
- Promote every language as stated in the bid and English must not be a lingua franca of EUt+, but one language among others
- Set cultural exchange, multicultural and interlinguistic activities
- Focus on specific support for both technical and everyday language
- To promote immersion in a foreign culture: not send group of students together, integrate students into the community

Innovative pedagogies

- Encourage student-centered pedagogy for autonomy and self-learning
- Do not confuse digital, trendy and educational quality
- Work on pedagogical interactions with industry
- Training and free up time for the professors and the lecturers
- Create micro-credentials based on skills

Self-customization of study track

- It is flexibility within clear a framework of final learning outcomes
- Help students to adapt their course to their specific needs and desiderata. Only the final learning outcomes are compulsory; each student's pathway must lead to them in an individualized manner
- Facilitate a percentage of the curriculum (e.g. 50% compulsory, 50% open to flexibility)
- Create a e-portfolio
- Should be aligned with future market needs

Modularization and flexibility

- Courses are offered in a flexible and modular structure
- Bring together optional modules from different disciplines (thematically connected blocks)
- Balance between encouraging students to think outside the box and help them structure their choices
- Keep post-university studies and micro credentials in mind

Civic engagement

- Students should become technologically responsible citizen
- Make students aware of major societal and fundamental issues
- Connect studies with real world and professional life
- Immerse students in real life projects to learn from the world
- Promote outside university engagement to help student grow and mature

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SUMMATIVE VIEW OF EUROPEAN DEGREE FEATURES - TABLE 1

Student-centered learning

- The curricula and lessons are fully described in learning outcomes
- Align method with academic rigor
- Also focus on developing students' soft skills: problem-solving, resilience, creativity, etc., without separation with "hard skills"
- Create bonds between students
- Ending traditional transmissive pedagogies
- Redesign lecturer's role from teacher to mentor
- Set flipped classroom techniques

Interdisciplinarity

- There is no realistic problem that cannot be addressed without an interdisciplinary approach
- A "must have" for future jobs
- Allow and encourage the crossing of disciplinary boundaries
- Redefine the role of technology: not built in a vacuum, it is built in and for society
- Create multi-disciplinary situations

Exposure / Engagement with research

- Gradually introduce the students to the importance of research and its methodologies
- Management support for academic inclusion
- Lower the distance between research and teaching
- Set 'learning by doing' research

Alignement with future labour market needs

- Align competencies/skills to work market needs (keep in mind the differences between countries)
- Do not make a distinction between training (in companies) and education (at university).
- Thinking that the jobs of graduates are not yet known. Train students to be flexible for unseen jobs.
- Create a virtual portfolio

Challenge-based experiential learning

- Give students unique experiences of learning (not just academic courses)
- Internships are required for student's maturity and expression of competencies
- Interdisciplinary projects allow to address societal issues

Academic rigour

Not addressed during the workshops

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DETAILS OF THE PROPOSED ITEMS

Hereafter more details about each feature.
NB : As not all the points were addressed by all the groups, it is normal for some lists to be longer than others.

EMBEDDED MOBILITY

The main aspect emerging in this part is that mobility per se is not self-evident.

- Mobility implies being able to move from one campus to another, with the modules being recognized in the different campuses and then a common regulation of the curriculum for modules considered in common
- There is a need of an education to mobility, as mobility per sé is not self-evident among all partners. Though it is consensually agreed on principle, there are still questions about actual implementation. One proposed way to approach this element is to inform about mobility and its benefits. This possible action can take place for both teachers and students.
- The chosen university should be the most adequate one for the students. It is thus important to establish ways (such mentorships and skill based definition of the courses) to prepare a personalized path for each student.
- Mobility could be embodied at all levels of students' projects (as from the second year to the final year). For example, we could create big projects that have an international framework, that encourage travels, exchanges, and are linked to associative works. Research could also be included in these projects
- Mobility concerns teachers and not only students. It should thus be integrated in the teacher life so that teachers can have real exchanges. The institutions should support this aspect.

Skills that students would benefit in terms of acquisition:
Global vision, intercultural experience, open mindedness, writing and speaking skills

EXPOSURE / ENGAGEMENT TO RESEARCH

Exposure to research was less discussed. The expressed comments were linked with interdisciplinarity and learning by doing.

- Research and teaching should be embedded (to lower the distance between research and teaching).
- There is a challenge in the involvement of research projects in undergraduate courses.
- Students must be competent in a transdisciplinary context and with applied projects (set 'learning by doing' research).
- Linked to mobility: in their internships, students could go to laboratories on particular research topics
- Importance of academic inclusion in the process, in order to benefit from a pedagogical and research experience. Management support for this inclusion is essential.

Skills that students would benefit in terms of acquisition:
See the world with different eyes, writing skills, critical approach to research

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DETAILS OF THE PROPOSED ITEMS

MULTILINGUALISM

Regarding multilingualism, the most discussed aspect is the cultural one. Cultural aspects of mobility are considered as important as learning a language per se.

- The greatest issue might not be the language but the ability to work as a team (socially and professionally) with people from different cultures and one cannot work with someone else, nor understand their culture, without speaking their language at a sufficient level. Everyone must make the effort to learn the other's language.
- In the same vein, cultural experience is very valuable. A facilitator for these two elements could be promoting multicultural and interlinguistic activities before leaving the origin campus and when arriving to the final destination. Moreover, only a long mobility allows a real discovery of another culture.
- Rather than language engagement as a specific goal, a middle ground might be to focus on local cultures. This way, the essence of what might be achievable in the practice of local language will be achieved in the appreciation of local culture.
- Even more, the cultural exchange between students can help creating a new mindset and thus structure a new European culture.
- When students are in a group with known people (friends for example), they could not make the same efforts to get to know new people and to learn languages. One possible road to avoid this dead end is to encourage students to avoid moving in groups. On the other hand, following this path will arise the problem of how to help the student to easily integrate in the new environment
- Be aware of promoting lesser-known languages, as written in the Bid. This means find a way to allow students not only to improve their English but also their German, Romanian, French, Spanish, etc. before and during the exchange semester. For example, we should prepare the acquisition of new languages with courses during high-school and during the first semesters that students spend in their origin University. To do so, Universities from different countries could offer (online) classes in their own language to students of the other universities to prepare them to cultural and language appropriation. This kind of action will allow students to have the core basis of the language and of the culture before their mobility.
- There are 2 levels of language that are relevant in our case: the technical language and the language used in daily life. Both must be addressed.
- Since language and thinking and deeply interrelated, it appears very important to work on languages and help students learn a second or third language to expand their worldview.
- Cultural awareness and appreciation can offer an ideal perspective to deal with understanding uniqueness and differences of environmental issues across Europe.
- Such opportunities will need specific support(s) for language learning.

Skills that students would benefit in terms of acquisition:
Global vision, intercultural experience, open mindedness, writing and speaking skills

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DETAILS OF THE PROPOSED ITEMS

INNOVATIVE PEDAGOGIES

What emerges strongly from the workshop is the need to redefine the role of students and teachers: to free time so that teachers can learn new techniques and follow students, and for students to become more autonomous in learning.

- Student-centered pedagogy is a way to personalize how the students are learning. However, one aspect to be addressed is how to encourage autonomy and self-learning.
- Encourage problem-based learning to create a problem-solving mindset.
- Rather than passive learning, enhance active learning, for example by setting flipped classroom techniques.
- Encourage the solving of real-world problems (e.g climate change), valorization of entrepreneurial skills with problem-based learning assessments or project-based learning projects.
- Work on pedagogical interactions with industry. As the hands-on competencies can only be acquired by learning by doing, it is important to structure a part of the courses in interaction with industry. This interaction could happen during internships but also during the “normal” semester with project-based teaching.
- Promote internships which will bring experience and maturity for students.
- To learn well, students will need available teachers. Is thus important to free up time for the professors and lecturers.
- Create micro-credentials, i.e., mini-qualifications that demonstrate skills, and/or experience in a given subject area or capability, can help in structuring in smaller portions learning and facilitate personalized learning.

Skills that students would benefit in terms of acquisition:
Autonomy, problem-solving mindset, resilience, creativity, teaching skills, critical mind, entrepreneurial skills

STUDENT-CENTERED LEARNING

Linked to the innovative pedagogies’ discussion has been the one on student-centered learning.

- Align method with academic rigor and describe differences between universities.
- Humans learn better when in a friendly environment, create bonds between students. To create bonds between students (current students, future students and alumni), we could for example create a network/association of EUt+ students.
- Because students do not only need to be taught but also need to be supported, redesign professors’ and lecturers’ role from teachers to mentors.
- The curricula and lessons are fully described in learning outcomes.
- Stop separating "hard skills" from "soft skills".
- Ending traditional transmissive pedagogies.

Skills that students would benefit in terms of acquisition:
Problem-solving mindset, resilience, creativity, autonomy, self-confidence, critical mind

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DETAILS OF THE PROPOSED ITEMS

CHALLENGE-BASED EXPERIENTIAL LEARNING

During the discussions, this feature has been strongly linked with real life problems and civic aspects.

- Addressing societal issues in concrete projects (not just courses) gives students unique experiences. Learning by doing using real life problems
- Internships as such can be considered as a challenge-based experiential learning
- Interdisciplinary projects to address societal issues could be another way to address challenge-based experiential learning

Skills that students would benefit in terms of acquisition:
Problem-solving mindset, resilience, critical mind, creativity

MODULARIZATION & FLEXIBILITY

Discussions on this part concerned not only how to allow flexibility but also on how to structure flexibility so that it does not become chaos.

- One first element in favor of flexibility will be the fact of opening out to other topics. A change in the modularization structure could thus be constructed to allow interdisciplinarity.
- This thus involves bringing optional modules (thematically connected blocks) from different disciplines together.
- One element that will require support is to encourage students to think outside the box when choosing courses.
- On the other hand, there is a need for structuring students' choices. For example, creating blocks/stream of modules from which the students can choose.
- The upside is the assurance that flexibility achieves free choice while ensuring an appropriate caliber of graduate. The downside is the administration associated with the professor/student engagement (for example, a contact point person(s) to ensure that the essence of flexibility is achievable and coherent across the European University partners.

Skills that students would benefit in terms of acquisition:
Curiosity, Transversal abilities but also specificity, being unique and themselves, responsible, self-knowledge

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DETAILS OF THE PROPOSED ITEMS

SELF-CUSTOMIZATION OF STUDY TRACK

The same kind of discussion took place on the self-customization of study track.

- Self-customization is a way a student can use to differentiate himself or herself.
- Importance to have clear learning outcomes to allow students to customize their tracks. Identify core-learning outcomes, and determine what can be learned in which university.
- Allow for core elements of degrees but also transversal options to be taken (flexibility within a framework).
- In the context of framing degrees, facilitate a percentage of flexibility in each curriculum (e.g. 50% compulsory, 50% open to flexibility).
- Flexibility achieves free choice while ensuring an appropriate caliber of graduate.
- To avoid students to not have jobs after their curriculum, stay in line with future market needs.

Skills that students would benefit in terms of acquisition:
Flexibility, self-confidence, critical mind, creativity

INTERDISCIPLINARY

Interdisciplinarity seems to be a more than welcome idea, in particular in relationship with society. Some discussions involves the passage from interdisciplinarity to transdisciplinarity ("transgression" of disciplinary boundaries)

- Allow and encourage the transgression of disciplinary boundaries: the transgression of disciplinary boundaries is a "must" have for future jobs.
- Technology is not built in a vacuum; it is built in and for society. Redefine the role of technology and its link with other disciplines and society.
- Create multi-disciplinary situations will oblige the students to take into account the multiple methods and points of view.
- Interdisciplinarity/Transdisciplinary (transgression of disciplinary boundaries) is also embedding of AHSS disciplines - Science, Art, and Technology.

Skills that students would benefit in terms of acquisition:
See the world with different eyes, critical mind, writing and speaking skills, creativity

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DETAILS OF THE PROPOSED ITEMS

ALIGNMENT WITH FUTURE LABOR MARKET NEEDS

Align with future labor market needs means to create adequate classes that allow to train our students but also to influence future market needs.

- Describe market needs in each country and match disciplines with it (align competencies/skills to market needs and consider disciplines between countries).
- Define the differential and complementary roles and missions of companies (training) and universities (education).
- To match students' competencies with market needs, create a virtual portfolio listing all courses/skills and competencies acquired.
- Align with market needs can also mean to influence the future employability- outside of traditional conceptions of work (for example the fourth industrial revolution and the impact of robotization).

Skills that students would benefit in terms of acquisition:
Sensibility to research, adaptability, responsibility, prospection, entrepreneurial skills

CIVIC ENGAGEMENT

Civic engagement has emerged not only as the sensitization to societal issues but also as an active engagement to solve those issues.

- Immerse students in real life projects (environment, digitalization, etc.) and learn from the world (examples: civic and social engagement, subsaharian Afric / community engagement - aging community- digital skills ...)
- Create multi-disciplinary (interdisciplinary) situations linked with real life (e.g., Fukushima, etc.), so that students consider problems at different angles (law, engineering, etc.).
- Because sometimes experience is more effective than teaching, promote outside university engagement to help student grow and mature.
- We want to create technologically responsible citizen, for this we need to change the modularization structure.

Skills that students would benefit in terms of acquisition:
Self-awareness, reflexive skills, empathy, motivational speaker, care for oneself, care for others and care for the planet, adaptability, open to difference.

ACADEMIC RIGOR

The topic was not directly addressed during the workshops

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II. PROBLEMS AND SOLUTIONS

In this section, we introduce the results of the workshops following a problem/solutions point of view. We introduce thus new categories based on the aggregation of suggestions discussed on the second half of the workshop. Solutions can overlap since a solution can address several problems.

A SHARED CURRICULUM

Create the same curricula for everyone is very difficult because each curriculum is specific to the countries.
So how to attain a shared curriculum?

- Address the problem switching from current curricula to competencies based curricula. In other words, think the competencies required to build the curriculum and define each programme and each course by skills and competencies students will acquire
- Generate a competencies-based approach : make a list/map of mandatory competencies shared by the different structures, and of additional competencies that could be acquired in different campuses.
- In order to graduate, students will have to achieve the mandatory competencies + the additional competencies linked to their future job specialization. Each campus will be free to design the best curriculum possible and to ensure its quality according to ESG. Competencies/credits will be recognized in the different countries without paying attention to where they have been obtained.

FINANCIAL ASPECT

Students may choose the easiest/cheapest country for their mobility. Indeed, they may be 'drawn' to the cheaper options (Ex: In Germany there are no tuition fees) and thereby create an imbalance relative to other campuses across the European University.
How to avoid a stream and a choice firstly based on financial aspect? How to guarantee that the personal and professional dreams of the students for a specific/local curricula would be ensured?

- Look at the tendencies in each university and collectively adapt
- Decide if we limit (or not) the number of available places in each country
- Create some form of cost-neutral model to ensure no one loses out financially

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II. PROBLEMS AND SOLUTIONS

ADMINISTRATIVE & INSTANCES

Ensuring the recognition of credits across universities might be difficult because of the differences between universities and countries.

How to ease the establishment of shared credits for EUt+?

- Switch the reflection from credits to competencies/skills
- Developing a tree/map of competencies
- Each University lists the courses that provide the expected competencies then build a shared curricula

When setting up the EUt+ project, we might be confronted with difficulties between Local and European legislations.

How to smooth relations between administrative instances?

- Negotiation with national authorities and accreditation systems
- EU might override national laws
- Contact ENAEE (and EUR-ACE + FEANI)

LANGUAGE

At all ages, it is difficult to learn foreign languages.

How to improve the ability of future EUt+ students to learn a different language than their own?

- Set a database of language courses so that students across the European University can decide where - and with what effort - their language engagements can be facilitated
- Preparatory classes in last year of high school
- Strong support in first semesters

Having an internship in a private company might be difficult for EUt+ students, especially for students with a very different language and with technical activity since it is the most difficult part of a foreign language.

How to maximize the possibility for students to get strong internships?

- Provide language classes on specific required levels
- People will communicate through English but will also learn the local language by being immersed in the culture

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II. PROBLEMS AND SOLUTIONS

IDENTITY & CONTACT

High school students might have never heard about EUt+ programs.

How to make promotion for EUt+ mobility and courses?

- Encourage the lecturers/Professors to move in EUt+ universities as enablers in the context of language diversity
- Some students might follow lecturers to the European University campus the professor/lecturer is actually teaching in

How to prevent problems about accommodation and integration with other students?

- Other students help new students
- Having both a local buddy and a professional mentor to help
- Promotion of student activities at the host campus should be encouraged

It might also be difficult to share our identity between universities as well as getting a shared identity across all EUt+.

How to find the balance between the identity we have from the country we left and the new identity we will have by joining an EUt+ campus?

- Create an EUt+ generic introductory module which all students must take (pedagogical approaches and all aspects of the EUt+ aims)
- Similarly, all academic staff teaching on our programmers must attend and complete an introductory module
- Having a longitudinal project shared across universities, collaboration project about European values or sustainable objectives (for example). Bring together issues about ethics, sustainability, mobility
- Encourage promotion of student activities at the host campus

LABOR MARKET

Some countries might appear more attractive for students, which could result in a “brain drain”. This phenomenon might be magnified by the fact that the future labor market is unclear and foggy so students might choose their destination according to the chance to get a job in the chosen country and not because of its courses.

How to avoid an unbalanced situation in which students will mostly choose a country because of its labor market and eventually settle down in it?

- Open discussion with European Union and local Foreign ministry to support people to find job in the host country and thus avoid this phenomena
- Constant conversation between EUt+ and the companies in each country
- Make contact with companies who might become partners

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III. SYNTHETIC VIEW ON IDEAS AND SOLUTIONS

This synthetic view seeks to present all the data that emerged in the different groups during the workshops. By analyzing the content with both a local and a global view, we defined the categories listed in the rest of this section. For example by connecting propositions about a program of yearly destinations, the creation of a cost-neutral model and a database of language courses, we decided to highlight the information and organization systems necessary to EUt+.
It is one proposition of reorganization and many others could have been done.

INFORMATION & ORGANIZATION

Regarding information, model or database that should be created for EUt+, many propositions have emerged during the workshop. First, it seems that a structured program of yearly destinations, guaranteeing teaching quality, standardized career-path etc. will help students to choose their future university. Second, some form of cost-neutral model will be required to ensure no university loses out financially when students will come and go through campuses. Finally, a database of language courses so that students across the European University can decide where - and with what effort - their language engagements can be facilitated.

BINDING WITH INDIVIDUALS

Because it appeared important to link individuals with other individuals, students will help incoming students. As it is done in some Universities, a buddy system will help students not feeling lost in their new environment. Moreover, it might be useful for new students to have a professional mentor who has a pan-campus vision on the program offerings to help them making better choices.
To promote a deep immersion experience, students might leave their country alone, with no friend. Otherwise, they might hang together and not have the opportunity to fully discover this new culture and way of living and bind with new persons.

EUT+ IDENTITY

Many ideas have emerged to promote EUt+ identity. First of all, it appears necessary to think with a “European Approach”. Thus, to raise awareness around EUt+ courses and programs to high-school students, encourage the Lecturers/Professors to present their University and their courses in foreign countries.
To promote a core basis for all, it might be very useful to create an EUt+ generic introductory module which all students must take: this covers pedagogical approaches and all aspects of the EUt+ aims. Similarly, all academic staff teaching on EUt+ programs must attend and complete an introductory module.
Moreover, having a collaborative project shared across universities allowing students and staff to work on European values or sustainable objectives (for example) will enhance EUt+ identity. Bringing together issues about ethics, sustainability, mobility, etc. and reuniting students of different Universities in such a project might also help them to find the balance between prior and new university identities. Another idea is to promote challenges from a European Industry stakeholders with other students who will also be on exchange like European Study Group in Industry. Mobility might be embodied in such projects.
Finally, to help students to take an active part in EUt+ without overloading them with administrative procedure, it might be a good idea to quickly generalize the adoption by all students of the European student card, allowing them to take public transport easily, go to the university restaurant and even borrow books (and more!). In the same vein, an e-portfolio would allow to share easily the student’s study path.

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III. SYNTHETIC VIEW ON IDEAS AND SOLUTIONS

THE 4 C'S: CURRICULA, COURSES, COMPETENCIES, CREDITS

The question of courses, credits and curricula that students will follow has been raised in all groups. A way is to switch focus from current curricula to competencies-based curricula. By making a list of mandatory competencies shared by the different structures, the European Universities will set their shared foundation of competencies that students must acquire whatever the foreign university they choose.

This means a strong preparation to describe programmes in competencies and learning outcomes, that subsequently build a tree/map of competencies and classes that each university is able to propose. If we follow the classical competencies approach, that could be 1) To describe a set of competencies for each programme, 2) To distribute these competencies among the courses, 3) To define the learning outcomes for each course, aligned with the competence, and 4) To define the teaching-learning methodology.

Moreover, bringing in courses thematically connected modules (maths, ethic to the evolution of technology, its impact, sustainability, etc) might help students to be conscious of their own places and their environment to become technologically responsible and aware citizens.

Since some skills cannot be learnt through theory only, promoting internships will enhance possibilities for students to get unique experiences during which they will develop teamwork, communication, problem-solving skills, as well as their ability to better understand themselves.

ADMINISTRATION & INSTANCES

Regarding future administrative communication between instances, asking for a European accreditation regarding immigration, national framework or regulation appears to be a safe shot to smooth interactions and prevent future problems.

To link students with market needs a proposition of contact with ENAEE (European Network for Accreditation of Engineering Education responsible for EUR-ACE label) has been made. In the same vein, taking contact with national Erasmus Agencies for Erasmus projects appears a perennial solution to help students funding their mobility.

Moreover, taking contact with the European Union and local foreign ministry to support people to find job in the host country and thus avoid "brain drain" and constant conversations between EUt+ and the companies also emerged as way to anticipate shifts between what is and what could be.

Finally, an effective communication systems (with harmonious services between universities) is required (as is a balance of resources) to promote the well-being of administrators and students in their journey in EUt+.

The question of EU laws overriding national laws has also be raised during the workshop.

CONSEQUENCES OF EUT+ AND OBJECTIVES FOR STUDENTS

Students must be able to acquire competencies relative to their field and transversal skills. Interdisciplinarity of courses is therefore a "must" and with a combination of quality courses, strong internships and meeting new individuals will allow students to develop their understanding, to care for oneself, care for others and care for the planet.

Building relationships with colleagues from other universities from abroad will permit students to become more aware of the importance that we are living in a society with diverse people.

At the end of their journey, students would have learnt a lot, both in term of technical and human skills (empathy, self-trust, etc.). They will be ready to build their professional projects as engineers as well as themselves as humans and citizens.

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→ EUt+ Masters in engineering : first wave clusters

Cluster name	UTCN	UPCT	h_da	TUDublin	TUS	RTU	CUT	UTT
European Masters degree in Civil Engineering and sustainability	Master of Science in Durable Concrete Constructions	Masters degree in Civil Engineering (Master de Ingenieria de Caminos, Canales y Puertos)		MSc in Sustainable Development + ME Sustainable Infrastructure	Technologies for utilization of renewable energy source		Civil Engineering and Sustainable Planning	
European Masters degree in Network and Telecommunication engineering	Master of Science in Telecommunications	Masters degree in Telecommunication Engineering (Master Universitario en Ingeniería de Telecomunicaciones)	MSc in Electrical Engineering and Information Technology International	MSc in Electronic and Communications Engineering	Telecommunications	Master Degree of Engineering Science in Telecommunications		Networks and Telecommunication (RT)
European Masters degree in Mechanical engineering	Masters in (1) Robotics, (2) Virtual engineering and competitive manufacturing, or (3) Advanced techniques in automotive engineering	Masters degree in Industrial Engineering (Master Universitario en Ingeniería Industrial)		ME Mechanical Engineering	Mechanical Engineering / Mechatronic Systems			Mechanical Engineering (GM)

European Degrees in Engineering

EUt+ Reference Guide

V.1

*In 2017, at the **Gothenburg Social Summit**, the European Commission laid out **its vision** for 2025 of a **European Education Area** in which the free movement of learners is guaranteed: "A continent where spending time in another Member State – to study, to learn or to work – has become the standard and where, in addition to one's mother tongue, speaking two other languages has become the norm. A continent in which people have a strong sense of their identity as Europeans, of Europe's cultural heritage and its diversity."*

This document draws on the basis of the European frameworks on education, the information we have on current developments, the expectations for the European Higher Education Area, the contents of the call for proposals for European Universities and our application to this call, as well as the feedback from the participatory workshops in EUt+.

The examples considered here are mainly from the engineering sector, as they are the majority in EUt+, and the examples are easily transferable to other sectors, such as management or arts.
This document deals with Bachelor and Master programs in engineering (tasks 3.1 and 3.2). It does not deal with doctorates or Master's programs in graduate schools (task 4.1).

Narrative

We come from a generation that has built the world by posing, often unwillingly, problems of a new magnitude, we must educate the generation that will be able to address them with wisdom to solve them.

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1 References, definitions and glossary

1.1 References and bibliography

1.1.1 External resources

European Standards and Guidelines 2015:

- english
- français

Documents on the European diplomas from the DGEAC:
See annexes

Documents on the framework of learning outcomes and competences:
Cadre de l'ENAEE
UNESCO documents on level descriptors use
"Dublin" descriptors: here, and there

Literature on curricula design and competency frameworks:

ORGANISER LA FORMATION A PARTIR DES COMPETENCES, MARIANNE POUMAY, JACQUES TARDIF, FRANÇOIS GEORGES, DE BOECK, JUIN 2017

BERTHIAUME, D. ; REGE COLET, N. (2013). LA PÉDAGOGIE DE L'ENSEIGNEMENT SUPÉRIEUR : TOME 1 : ENSEIGNER AU SUPÉRIEUR. BERNE, SUISSE : PETER LANG.

BERTHIAUME, D. ; REGE COLET, N. (2014). LA PÉDAGOGIE DE L'ENSEIGNEMENT SUPÉRIEUR : TOME 2 : SE DÉVELOPPER AU TITRE D'ENSEIGNANT. BERNE, SUISSE : PETER LANG.

1.1.2 Internal ressources

See annex **"Competency framework of the European University of technology Masters of engineering" / "Compétences générales des Masters Ingénieurs de l'Université de technologie européenne"**

1.2 Definitions

(Pedagogical) competences: "know how to act and manage complex situations"
Jacques Tardif's definition based on the work of Noam Chomsky: it provides a corpus of competencies that is very stable over time, that describes particularly well the "character traits" of a student trained in a given institution or program, and that is robust to changes in professions and disciplines. It best formalizes the "digital footprint of a school" beyond the

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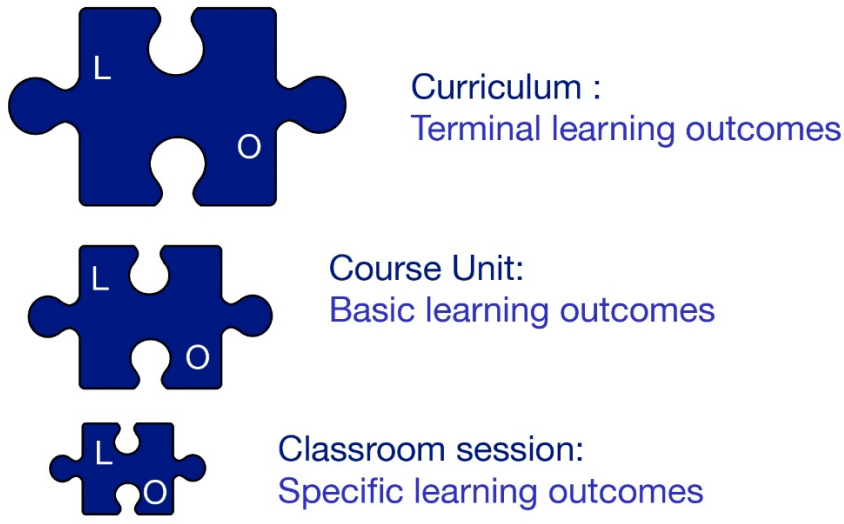
affective “alma mater”, while providing a clear pedagogical framework for effective and persistent learning. In this sense, the corpus of pedagogical competences constitutes the fixed point of the “learning contract” between the school/university and the student.
Example of a pedagogical competence (extracted from the EUt+ Master Pedagogical Competences): “Piloting a process or system reliably and efficiently; deciding, planning and organizing with a holistic vision; anticipating and preventing direct or indirect local impacts of a system on its territory, while being aware of the global challenges.”

Learning outcomes: “At the end of [an educational activity to be specified], the student will be able to [production to be specified]”.
[a pedagogical activity to be determined] = any pedagogical activity which can be a 2-hours lecture, a full semester, a project or a period in a company...
[Output to be determined] = any ability that the student will have acquired as long as it is precisely defined, which may be “expressing the gradient in the three usual coordinate systems”, “describing with suitable mathematical tools the hydrodynamic speed field”, or “having the C1 level in German”.

For practical reasons, a distinction is often made between (From kitmap, Université de Nantes) :

- specific learning outcomes (acquis d’apprentissage spécifiques)
- basic learning outcomes (acquis d’apprentissage élémentaires)
- final learning outcomes (acquis d’apprentissage terminaux)



This is structured pedagogically as follows:

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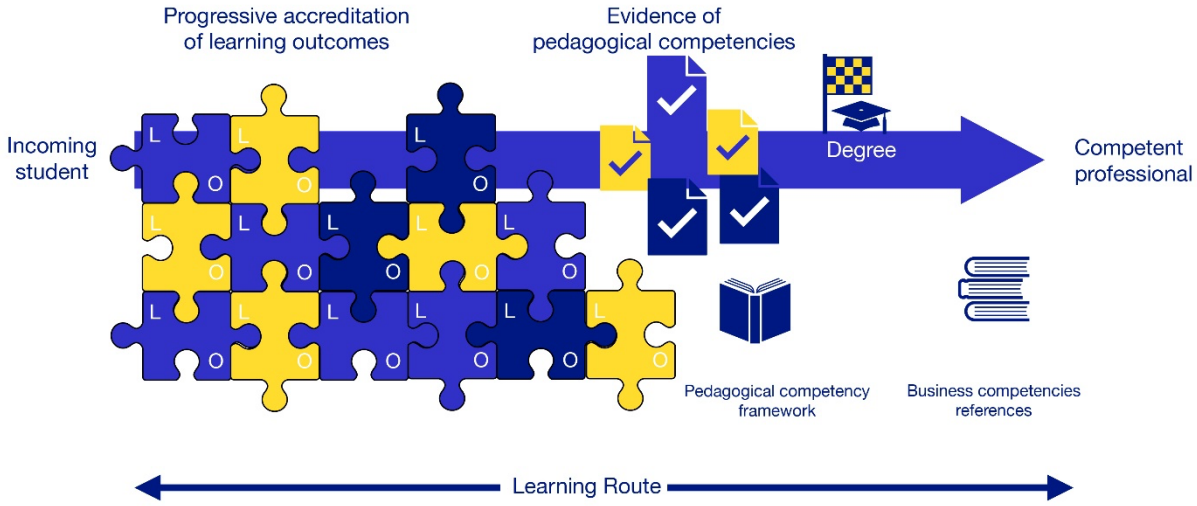

Articulation of competencies and learning outcomes
Based on D. Lemenu and E. Heinen (2015) in "How to move from competences to learning assessment".

In the context of the European diplomas of the EUt+, the target programmes are defined in terms of final learning outcomes. They are the precise description of the learning outcomes for each of the degrees.

The descriptions of the modules (or the smallest exchangeable unit) will be made by basic learning outcomes. Generally one elementary learning outcome per ECTS (or a little less) will be listed. This is the basis for discussion between teachers.
The degree framework is described by final learning outcomes. These will usually be in the order of 15 to 20 for a Bachelor of Engineering and about 25 (or slightly more) for a Master of Engineering (in which case the Master learning outcomes will include, explicitly or not, the Bachelor learning outcomes.

1.3 Generic principle of a student's curriculum

According to the above definitions, the principle of a student's curriculum is as follows:

- A learner is enrolled in the programme because
    - he/she has learning outcomes from previous training and experience
    - He/she demonstrates a capacity to achieve the learning outcomes required for the qualification
- In various ways, he/she collects the basic learning outcomes to progressively validate the final learning outcomes.

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- When he/she has validated all or almost all the final learning outcomes, by means of one or more concrete and complex cases, he/she proves his/her ability to apply them, thus validating the pedagogical competences.

Each step of this progression is monitored by the teachers, who are responsible for guiding the learner, in particular according to his or her prerequisites, then the validated outcomes and the choices he or she wishes to make. Self-assessment and the e-portfolio are essential tools for the acquisition of learner autonomy and for dialogue with teachers.
The teachers validate in particular the final competences, which must be assessed in more or less complex situations.

1.4 Curricula convergence trajectory

The current curricula are converging towards the European curricula through:

- the progression of each of the existing curricula towards the general principles and schemes described below
- the final learning outcomes which allow the design of a “common curriculum”, identical for all students, making local offers compatible.

From the bid:
Each curricula group will progress according to the three-phases schema of (1) harmonized management; (2) decentralized management; (3) deconcentrated management.

	Phase 1	Phase 2	Phase 3
Curricula management	Harmonized	Decentralized	Deconcentrated
Academic regulation	Compatibles for mobility	Identical	Single
Steering	Collaborative	Linked in network	Single, with subsidiarity for operation
Degree	One per campus, same field	One per campus, identical, or joint degree according to national regulation	Only one for the EUt+
Estimated duration of the phase	1 year	2 years	2 years, depending on regulations

Each new curriculum will be integrated from a group of pre-existing curricula from 3 to 5 campuses.

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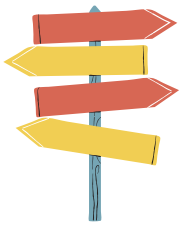
2 The 12 characteristics of the European degree for the EUt+ Bachelor/Master engineering curricula

2.1 Embedded mobility / multi-campus model



Embedded mobility happens when one or more substantial periods of mobility is structural to obtain a degree and that the curriculum is inherently delocalised. The exception is the absence of long or even majority mobility in a curriculum.

In order to build themselves and their vision of Europe, our students need to *experience an in-depth exposure and immersion*. This can only be achieved through *long and transforming mobility*.

Mobility is not an end in itself, but a necessity to be exposed to others and their cultures, and to discover oneself.
Mobility is therefore a way of being more than an operation of geographical movement. For the EUt+ European degrees, students are guided towards this state of mind which leads them to meet other cultures in the long term. They travel for at least several months, ideally for a full semester. They attend classes on the host campus alongside local students and other students on mobility.
In this regard, a short mobility does not make sense, nor does mobility only in a lingua franca. Meetings take place during lessons, during personal work, but also and above all during informal encounters outside teaching periods.

Short mobility lasting a few days or weeks are not supported or taken into account for European degrees, as they do not provide the necessary depth of immersion. Moreover, they would generate too much carbon impact for a limited time, for the sole benefit of being able to say that one has briefly set foot elsewhere in Europe. They do not allow time for immersion in the culture of the other, no time for a deep encounter...
Virtual mobility, an oxymoron by nature, must not be used as a cover for an absence of mobility. Immersion is an encounter, the virtual does not allow a real encounter. However, after meetings and links between students, videoconferences and tools for working together at a distance allow relationships to be pursued. The virtual is used as a tool to continue a meeting. It is also useful to prepare for mobility (language learning, etc).

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From the bid:
Mobility needs to be financially sustainable, simple, attractive and pedagogically embedded. As such, mobility will be almost exclusively for one-semester chunks of time or more, in order to allow a real immersion within the partner institution and the local culture and language, as well as to amortize its carbon footprint.

From the bid:
Firstly, it should be noted that the European framework harmonises levels B, M and D in the EHEA, and characterises them by the Dublin descriptors. It does not align with the exit level of high school. Thus, the existing difference between the 6 and 8 semester-duration Bachelors serves mainly to align the levels of competences in the form of an "entrance buffer" of variable duration in order to eventually reach the same official level of competences.

Narrative

"At the end of her journey, she would have learned to know herself better, to be self-confident, and she is now able to build her own career path. This other-Eut+-campus experience was so enriching, both in terms of learning outcomes and life experience, and allowed her to grow. The experience was all positive, because, even, the 'mobility' was quite easy, in fact. She felt at home on this foreign Eut+ campus. The university environment was well prepared to welcome her, and everything went smoothly: she got an Erasmus grant, no difficulties with accommodation, her European student card allowed her to take public transport easily, go to the university restaurant and even borrow books.
Everything Robyn learned and experienced during this semester gave her the desire and the strength to apply for another semester, this time in Dublin."

EUt+ Bachelor

Long-term mobility for a young student at the beginning of his or her studies, or if he or she encounters a tough time, can be a disincentive to enroll in a curriculum. In programmes that include these more fragile students, a trip lasting a full semester, supervised, prepared and in a group, makes it possible to offer a more progressive immersion by reducing apprehension. Mobility is therefore proposed as a trip for a full semester, with a pre-validated list of courses, proposed in the continuity of the courses already completed in their curriculum. It is therefore, in fact, a linear curriculum with a semester offered in another campus, where the immersion is carried out in a comforting group.

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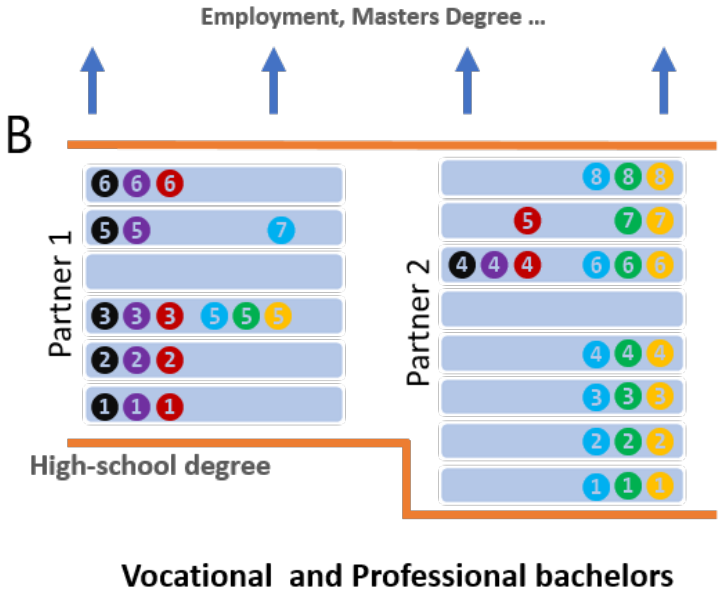
From the bid:



For vocational or professional Bachelor's degree courses, with more vulnerable groups for whom mobility is not an easy matter and employability is above all perceived as local, we adopt structures that are more reassuring for students. They move in groups for a specific semester to another partner, according to a predefined programme when they are globally linguistically and pedagogically ready. Additional individual mobility is then allowed for the most motivated students (e.g. cyan and red). The degrees correspond to a global competence scheme which is harmonized at EUt+ level, but is declined in function of the environment of each partner.

EUt+ Master

In the "Master" programme, which may include the "Master full track" (i.e. the Bachelor part) mobility is fully integrated. As soon as the student is ready for mobility (validated by the teachers, generally at the end of 1 to 3 first semesters), the student freely follows his or her curriculum on the different campuses. Only the pedagogical coherence of the courses is taken into account.

From the bid:
For the Master's courses (2 years or direct), the curricula will be fully joint. As soon as the "buffer entrance" phase is passed, students are free to choose their course according to the skills they wish to acquire, the partners they wish to visit and the details of the offering. The minimum mobility path is shown in blue or yellow (one semester). The green and black itineraries correspond to what we hope will be the majority in the long term. At the end of the complete convergence process, the course in red should be an exception only for students with difficulties that do not allow them mobility (it will only give the national degree and not the European one that we are aiming for in the long term).

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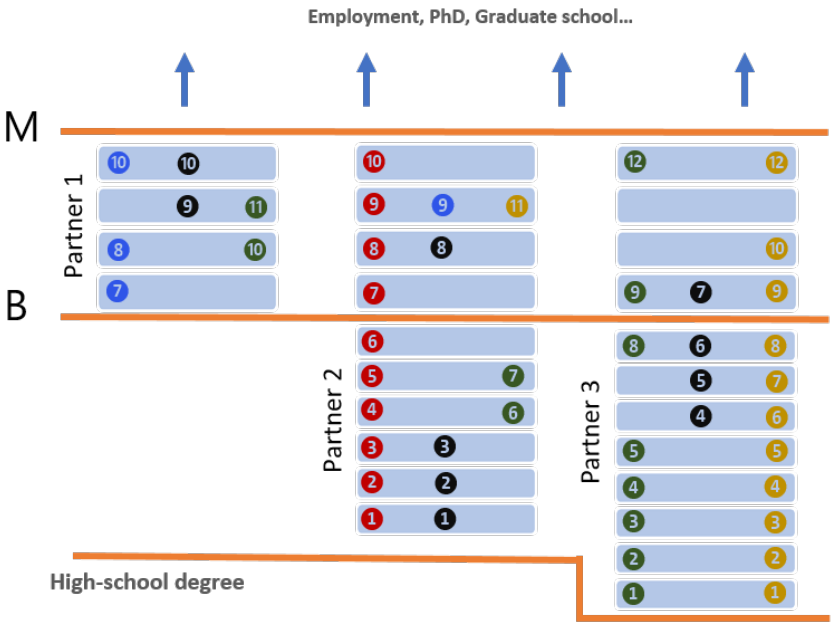

Master of engineering
(2 years or direct curricula)

Through a competences-process and program-approach developed by all the teams in the convergent curricula group, a single competences framework is established and shared for each Master of Engineering target curriculum. The same (single) academic regulations will be applied on all campuses.

From the bid:

Objectives of the proposal	***Indicators:*** *List relevant quantitative and qualitative indicators showing whether and to what extent the objectives of the alliance are being achieved. Please indicate your target where possible.*	***Source of information:*** *How could these indicators be measured? - What could be the sources of information?*	***Assumption and risks:*** *What might be the factors and conditions not under the direct control of the alliance which are necessary to achieve these objectives? What risks have to be considered?*
• Multiculturalism	• Share of EUt+ students who will have spent at least one semester at one of the EUt+ campuses • Efficient communication and daily running of EUt+ Efficient communication at meetings involving representatives from different campuses	Multiculturalism and multilingualism overseeing committee reports (quality management, Task 1.3)	• Financial resources Specific local constraints limiting mobility

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2.2 Multilingualism / Multilinguisme

Multilingualism is the ability to meet others in their own language and when international exchanges are not reduced to a single lingua franca, opening up the richness of the deep diversity of languages and cultures.

The Erasmus preamble states that every European student with a higher education degree should be able to work in at least two foreign European languages in addition to their own. Multilingualism does not mean having one's mother tongue at home and a single lingua franca for study and work. It means being open to a diversity of languages, both in learning and in working.

The fundamental principle on EUt+ languages is that linguistic diversity is a richness, that there is no nobler language and that a native language should not provide an a priori disadvantage. As a corollary, one strives to meet the other in his or her language and not in a lingua franca.

As a reminder of the objectives set out in the EUt+ application and the European Union objectives, in order to maintain linguistic diversity, in particular for the implementation of study programmes:

- Each of the partners with the most widely spoken languages (English, French, German and Spanish) teaches in its national language;
- As a result, each partner prepares its students for learning in other languages on the other campuses and prepares itself to welcome on its campus students with a lower level of proficiency in its national language. In particular, language support courses are organised at the beginning or during the semester;
- Each of the partners with less widely spoken languages (Bulgarian, Greek, Latvian and Romanian) offers courses in other languages for incoming mobility students;
- Students in mobility with low-dissemination language partners are required to follow a course in the host partner's national language at a level of A1 in one semester and A2 in two semesters;
- Low-spread languages are promoted as much as possible among all partners;
- Each partner progressively imposes the mastery of one European foreign language at Bachelor level and two European foreign languages at Master and Doctorate level;
- Particular emphasis is placed on opening up the staff (academic and non-academic) to linguistic diversity and their practice;
- In general, there is a benevolent attitude towards the development of language skills, especially in situations;
- These language provisions do not hinder the development of knowledge of other European or non-European languages.

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A language observatory is indicated in the application and particular care is taken to ensure that it functions effectively and that its conclusions are taken into account.

From the bid:
We strongly encourage multilingualism. On our campuses, 9 out of the 24 official languages of the EU are spoken, and all three alphabets of the EU are used. We will harness this linguistic and cultural richness to work towards the achievement of ambitious objectives. By 2025:

- students having completed a Bachelor's degree will master at least one foreign language at B2 level. At least 30% of them will have benefited from physical mobility and at least 50% from virtual mobility;
- students being awarded a Master's degree (engineering or other) will master at least two foreign language at B2 level. In steady state, at least 80% of students will have undertaken part of their curriculum abroad.

It should be noted that EUt+ is far from being the most ambitious Alliance in this field. In the European Reform University Alliance (ERUA), the Université Paris 8 has opened Danish and Bulgarian courses (German and Greek had already been taught there for a long time). We therefore believe the objective is attainable.

It is essential that students understand that monolingualism does not open up sufficiently to the culture of others, to their way of thinking. Nor does English alone allow students to find a job in a non-English-speaking country, where mastery of the national language is almost always necessary to find a job, and even more so to integrate.

Narrative

"Looking at the courses that would allow him to validate the skills he is aiming at, he sees that they are available in Cluj and Dublin. He chooses to go to Cluj first, based on the fact that he already knows English. Learning Romanian appears to be a more interesting challenge, in terms of intercultural opportunity.
He decides to leave his home country alone, with no classmates, so as to fully be immersed in this new culture and way of living."

EUt+ Bachelor

In the EUt+ Bachelor programme, at least one foreign language at B2 level is required. It will be necessary for the mobility semester. This language will generally be English. In view of the continuation in Master, the acquisition of a second language at an intermediate level in Bachelor is more than recommended. This will also open up the field of mobility.

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In doing so, we remain below the European expectation of two European working languages in addition to the native language for higher education graduates. However, we believe it is a useful first step, being already an improvement as regards the current situation, and will generate insights for iterative improvement.

EUt+ Master

At Master's level, students are expected to master two European foreign languages at B2 level. The deepening of one of these two languages to C1 or even C2 level will almost always be obtained, following the mobility already experienced during the Bachelor's degree and continued at this level.

From the bid:

Objectives of the proposal	***Indicators:*** *List relevant quantitative and qualitative indicators showing whether and to what extent the objectives of the alliance are being achieved. Please indicate your target where possible.*	***Source of information:*** *How could these indicators be measured? - What could be the sources of information?*	***Assumption and risks:*** *What might be the factors and conditions not under the direct control of the alliance which are necessary to achieve these objectives? What risks have to be considered?*
Multilingualism	All Bachelor students will have a certified B2 level in one foreign language All Master students will have a certified B2 level in two foreign languages Meetings between students of EUt+ will take place in several languages Meetings between EUt+ faculty and/or administrative staff will take place in several languages Efficient communication and daily functionning of EUt+	External official language tests Multiculturalism and multilingualism committee observation reports (quality management, Task 1.3)	Local and/or national and/or European higher education support Financial resources Specific local constraints limiting mobility

2.3 Self-customization of study track

Self-customization of study track is the possibility for all students to choose their own course track to fulfill the learning outcomes required for their desired degree.

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The choice of courses does not come from simply more permissive vision of training “menu” or “à la carte”. It has a deeper cause which must be understood before it is implemented, in order to avoid making substantive mistakes.

A degree is the proof attested by a higher education institution of (pedagogical) competences that will allow a given degree of professional and possibly civic autonomy. We understand competences here in the sense of Jacques Tardif, i.e. “knowing how to act in a complex environment”, because they are profoundly structuring pedagogically by ensuring, in particular, the persistence and adaptability of learning. Competences are the deep mark, the digital imprint of the graduating institution. They are based on an underlying set of values, and they characterise the approach and professional development of graduates. Even in a rapidly changing world, with rapidly obsolete techniques, or graduates changing career paths, competences remain stable over time. We will generally count 3 to 5 competences for a Bachelor’s degree, and 5 to 7 competences for a Master’s degree.

It is important to remember that a competence constitutes an autonomous know-how, in the sense that it includes all the elements necessary for its achievement. It is therefore rare that there are purely scientific competences and others that are purely technical or purely “attitudinal”; an engineer, or even any professional, will need to mobilise all these elements simultaneously for the effective performance of a task. The higher the level of qualification, the more strongly this is the case: executive professions require a general approach to problems, unlike highly technical and specialised professions that have been trained in secondary education.

The pedagogical implementation of a degree requires a list of learning outcomes that the graduate must master independently, and that he/she must learn to usefully engage in a complex situation. A learning outcome can be defined as “the ability of the student to do [this] at the end of [a piece of training]”. For a given degree, the list of final learning outcomes is appropriate. It may usefully be supplemented by basic learning outcomes, which are not binding but which help to build up the learning pathway. These learning outcomes are fairly flexible and can be periodically adapted according to the evolution of techniques, the economy and society. In a way, it is the concrete instantiation of competences at a given time. Depending on the granularity level chosen and the mode of description, one final learning outcome can be considered for 5 to 15 ECTS. It can be very precise (e.g. Validate a C1 level in English), more open (e.g. Validate a C1 level in a European foreign language) or very flexible (e.g. Describe with relevance the relevant structure-property relationships of a material).

A list of courses to be validated does not guarantee the learning outcomes for many reasons (partial compensation of courses, general structure not adapted to the particular case of each student, contents of the courses decided independently without global coherence...). Modularity and flexibility are here given to the student to progress on the learning outcomes to be validated, according to the means available to him/her (formal teaching, other teaching

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provided elsewhere or abroad, prerequisites, projects, internships, community involvement…). What is important is that the student validates all the learning outcomes in one way or another and that, before the degree, he/she has been able to prove his/her capacity to implement them in several complex situations related to the young graduate's job.

Far from giving the student total freedom of choice, the customised construction of the pathway is a "co-responsibility" of the student with a teacher-referent for the validation of all the final learning outcomes. Thus, no course is formally compulsory, but no learning outcome can be avoided and the final demonstration of the mobilisation of final learning outcomes in a complex situation must be carried out by the student.

Flexibility in building the learning pathway is intrinsic to this approach. It starts from the very first day (each student, even if he or she has a sufficiently high average level, comes with various preliminary learning outcomes on which to build). It allows each student to follow a more or less different path, and allows periods abroad without them being a *de facto* derogation, as they will simply have to contribute to the progression towards full validation of the final learning outcomes.

The follow-up of these learning outcomes requires that each course be described in terms of basic learning outcomes (approximately one basic learning outcome per ECTS) allowing for the follow-up of the student. The student's progress is usefully monitored via an e-portfolio, a record and pedagogical anticipation of the student's progress, which can be consulted in particular by the teacher-referents, and is a real Ariadne's thread for the educational process.

This responsibility (supported and supervised) given to the student enables in particular:

- A stronger sense of responsibility of the student for the courses he/she has chosen;
- A choice at a time that is often more favourable pedagogically for the student, who chooses courses more spontaneously when he or she is ready;
- Freedom of movement geographically (and temporally).

The concept of repeating a year or semester disappears (but not the possibility of attending a course twice if necessary to validate it). Some students can go very fast, and validate more than 60 ECTS per year, while others will be slower (depending on the student's time or intellectual availability), and this can also vary over time.
Experience shows that students behave very maturely towards this system, which does not generate any major drift, and that the duration of graduation is not substantially increased. On the other hand, there are many spontaneous double degrees and interesting or original pathways.

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Narrative

"She needs to know what her options in the EUt+ framework are: the choices available, the credits, the progression of courses… With the help of her teachers, she identifies what competencies and learning outcomes are missing for her training to be complete.
Because sustainability is one of the major issues of today's society and EUt+ campuses are in advance on the issue, Robyn can choose her courses on this subject from different EUt+ universities and pick the best for her from every campus, and thus design her own path of studies."
"Robyn progressively wants to achieve more autonomy and she is happy to be provided with excellent learning facilities and resources, which enable her to follow her own schedule at her own pace, in compliance with her personal objectives. In this way, Robyn is able to manage her time more effectively and make the most of her stay, absorbing various aspects of the local customs, traditions, and lifestyle."

EUt+ Bachelor

The EUt+ Bachelor model leaves a small margin for students to define what they need. It is based on the full implementation of the Bologna process.
Around a common core for all students:

- The initial level of students is ensured by checking their initial learning outcomes. Gaps are filled, already demonstrated learning outcomes exempt them from relative courses. The level is thus readjusted on enrollment.
- Learning outcomes may be obtained through work experience, community work or other activities. In this case, they will be proven by the student and validated by the teachers.
- During a semester of mobility, or when choosing courses that are not offered in the "standard curriculum", learning outcomes are credited without restriction or constraint if they match a relevant pathway towards the final learning outcomes of the degree.
- Systems of electives allow for different ways of acquiring competences.

EUt+ Master

The curriculum is fully based on the generic principle that requires:

- A free pathway where the student progressively validates basic learning outcomes that ultimately cover the final learning outcomes of the degree;
- Proof of validation of competences during an in-depth experience, in a company, on a real project, or in a research laboratory;
- Support from a referent teacher who guides the student in his or her choices;

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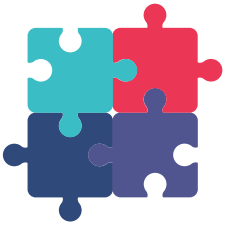
- A European pathway where at least one semester of mobility was carried out during the Master's degree and one during the Bachelor's degree (or two during the Master's degree, if this was not the case during the Bachelor's degree);
- The pathway is recorded and monitored in an e-portfolio.

Some courses have prerequisites or requirements to be followed. These prerequisites are, however, reduced to the minimum pedagogical requirement.
To help the student, standard pathways are suggested, but they are not prescriptive.
The initial level of the student is assessed and possibly compensated for, if initial learning outcomes were lacking or if they had already been demonstrated elsewhere.

2.4 Modularisation and flexibility



Modularisation and flexibility are the possibility for courses to be chosen (or not) at different moments, by students of different programmes, without overall constraints, only because they fit pedagogically in the individual paths.

Modularisation and flexibility are the necessary technical corollaries of the freedom to build a pathway left to the student and the freedom of movement between campuses.
They also allow for adaptation to a variety of audiences (students working in parallel with their studies, disabled people, etc.) as well as original courses (double degrees, additional training outside the initial stream, etc.).

Modularisation and flexibility definitively anchor the notion of competences and learning outcomes as the framework for training, since pedagogical articulations can no longer be made directly between teaching units (which are largely versatile building blocks and are no longer subdivisions of a single degree pathway).
It should be noted that the gathering of students with diverse backgrounds in a course should be usefully used as an advantage.

Modularisation and flexibility imply a clear need for student monitoring, which should be done by means of a pedagogical e-portfolio, in which the student records his or her track and associated basic learning outcomes. The e-portfolio is accessible to the teacher (as soon as the student enables it), and then the learning outcomes are checked and validated in accordance with the curriculum.

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Narrative

"Robyn is aware of the shared learning outcomes in the diploma and of those that are required for him to succeed in his semester. However, he has some doubts about his choice of courses. So, he contacts a mentor who has a pan-campus vision of the programme offerings. The mentor offers advice on the choices available: it is possible to acquire similar learning outcomes through different pedagogical methods (learning by doing, industry placement, laboratory engagements, research group placement, and so on). "
"His fellow students from different engineering backgrounds are able to join his courses because of flexible, additional short-time qualification courses: these are not necessarily STEM subjects, but are drawn from a diverse range of humanities and other courses, including social aspects, including music and arts, as well as sports. "

2.5 Student-centered learning

Student-centered learning implies no longer being interested in the teacher's delivery, but in what the student will ultimately be able to achieve as a learning outcome. The programmes are delivered in a way that encourages students to take an active role in creating the learning process, and that the assessment of students reflects this approach.

Student-centered learning is precisely defined in the quality assurance process: it is point 1.3 of the European standards and guidelines. It is also the "core" of the concept of learning outcomes.

The main idea is to focus on what the student will be able to restitute from his/her learning and not on what the teacher will have "taught" during his/her teaching. Thus the description will be based on learning outcomes, both at the level of the course unit (basic learning outcomes) and at the level of the degree (final learning outcomes).
All the guidelines of point 1.3 of the ESG are to be considered at the level of each course and the overall curriculum.

The pedagogical methods used, as long as they are in line with student involvement as defined in ESG 1.3, are the teachers' freedom and responsibility. Teachers are free to choose the methods they use as long as:

- They put the student at the center of the learning process;
- They guarantee a solid and lasting acquisition of learning outcomes;
- They are addressed to all the students concerned, included in their diversity, with success for all;
- They respect the means allocated by the institution;

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- They are in line with the ethos of the institutions and of EUt+ (this is explicitly reflected in the competences of the degree).

In this context the student is evaluated on the learning outcomes. What is expected of him/her must be shown in a previously stated context.

No numerical marking can provide a comprehensive assessment of these learning outcomes, which must be explicitly assessed. Indeed, the normative nature of numerical marking does not clearly reflect a learning outcome. By giving an illusion of objectivity and impartiality, it prevents a real assessment of the student's abilities, and by standardising according to criteria that are very often implicit, it prevents the richness of student diversity, which is often welcome for the continuation of the curriculum and professional integration. Finally, as mentioned below, they generally express an ability to fit into a learning scheme that is more akin to behaviourism, through the ability to conform to an exercise with a strong implicit codification, than to the progressive construction of skills. Finally, it is important to make a real assessment of the learning outcomes, in the context in which they have been defined:

- not beyond, although it is welcome to always challenge students reasonably and to encourage them to go further than the strict framework of the syllabus;
- not below, whether to maintain a minimum success rate, compensate for an overly ambitious programme or for limited resources.

Care should also be taken with assessments that require students to provide answers to overly prepared questions, which would not then question the real appropriation of what they have learned.

Work on this subject has shown that the persistence of learning is largely dependent on metacognition and in particular on the student's ability around:

- Self-evaluation
- Identification of know-how

Self-assessment and cross-assessment should therefore be developed as much as possible. The construction of the *e-portfolio* also firmly consolidates these two fundamental capacities for a solid training.

Since learning is student-centered, the quality of teaching is therefore measured by the overall added value in student learning outcomes. The inclusive values of EUt+ invite us to measure the quality of teaching in terms of the success of all students. In this sense, the support of the student on a differentiated pathway must be carried out with particular attention to ensuring the mastery of the prerequisites which must be precisely given for each teaching unit.

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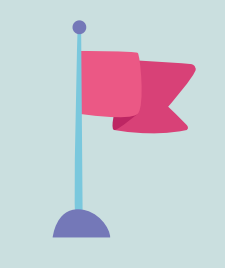
2.6 Challenge-based experiential learning



Challenge-based experiential learning involves learning by nearly constantly immersing students in a conducive, stimulating, visionary environment to solve real-world challenges.

The transition from transmissive teaching methods to a socio-constructivist approach is disrupting the core of learning. The focus is shifting from lecture-based teaching to immersing students in an environment that expects them to be active and collaborate in solving the problems they have been given. It is therefore no longer a question of a few projects here and there, but of a "training core" which is articulated around at least one major project allowing a supervised learning trajectory towards the achievements of the diploma.
Such an evolution requires in-depth work that takes time: it is a general transformation of the university environment, towards methods such as those developed at the MIT MediaLab, for example.

This is closely linked to new pedagogical methods: "Challenge-based experiential learning" should not compensate for too much traditional teaching, but as a new basis for structuring pedagogy. It is therefore necessary to support teachers in this process.

Narrative

"Projects are a central part of Robyn's courses, and her final project would be an important assessment of her EUt+ diploma. Robyn chooses to work on an interdisciplinary project entitled 'Ethics in technology: how to overcome the future?' During this project, Robyn interacts with students from other EUt+ campuses and develops a variety of skills: a problem-solving mindset, leadership, teamwork, but also creativity. Robyn also learns to question her own role in society in a conscious way."
"In seminars she approaches challenges from real-life situations in power plants of different European countries. In a collaborative way she and the other students find solutions for these challenges. Their teachers supply them with insights from their current research projects. "

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2.7 Innovative pedagogies

Innovative pedagogies are the decisive shift towards socio-constructivist, student-centered pedagogies, with all professors having a deep knowledge of the didactics of their fields, team-working to apply the most effective methods.

The teacher, the professor, is no longer there to recite disciplinary knowledge and expect students to answer correctly to a series of questions. He or she is no longer a lecture provider. He/she has to design a supportive, stimulating and visionary environment in which the student is immersed, and has a role as a leader-catalyst for the students in their process of acquiring learning outcomes.

The objective is not, in fact, innovation as such, nor is it innovation for innovation's sake. It is above all to use the most effective practices for the students we are teaching and the objectives we are pursuing, supported above all by a very good knowledge of didactics by the teachers.

Innovative pedagogies have nothing to do with the excessive digitalisation of teaching or the introduction of digital technology or original teaching formats that are "fashionable" or inspired, without sufficient prior reflection, by institutions with high media activity.
It is a question of leaving the transmissive doctrine of training, which institutes a transmission of knowledge based on a highly asymmetric exchange. Student-centered learning, valuing the learning outcomes, their persistence, and their effective mobilisation is the objective to be achieved. It substitutes for the evaluation of the student's ability to reproduce the barely contextualised content of lectures or tutorials.

These pedagogies place the student at the centre of the learning process and his or her ability to mobilise what has been learned as proof of quality. This is a deep evolution of the hierarchical representation associated with "traditional" teaching methods. It should be noted that digital tools remain fairly neutral in these developments, as the medium does not in itself lead to any modification of the pedagogical relationship, except that it largely supports the communication between students around a given problem.

The management of "challenge-based experiential learning" requires such a pedagogical evolution.

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Narrative

"There are other students in his class with a similar age/work profile, so he does not feel isolated or lonely. The class is organised around group working so he has an opportunity to get to know the others. These older students also help the younger ones by giving them confidence to speak out and ask questions in class."
"Students keep an e-portfolio of their work which allows them to reflect on their learning and to demonstrate how they believe that they are meeting the described learning outcomes for the programme. This forms part of the final assessment."

2.8 Academic rigour

Academic rigour refers to professors having a comprehensive and extensive knowledge and a deep and critical reflection to teach and expect from their students to a high demand.

In fact, it is more the teacher who is involved in this, to ensure that the content transmitted is already up to standard, with knowledge that is not isolated or superficial.

One can only demand from the student what he or she has been taught, not only as a subject, but also as a model of behaviour. Academic rigour is required of the teacher, both in terms of mastery of what he/she teaches and the associated didactic tools, but also in terms of the state of mind that he/she communicates to the student.

The teaching of learning outcomes in an active form leaves the student a great deal of autonomy in the progression. The teacher is not the source of transmitted knowledge, but guides the student on a learning journey which is not linear, and which must constantly be adapted to what arouses the students' interest, to technical developments, to new jobs, to current topics, to interactions with other courses or to varying prerequisites or cultures. It is therefore necessary for the teacher to have a broad and deep knowledge of his or her field. They cannot simply teach a pre-prepared course or moderate tutorials according to the only method they know. Academic rigour requires a broad and solid knowledge that gives the necessary ease to have no difficulty in guiding students in unexpected directions with relevance and hindsight.

Teaching cannot be satisfied with mastery of one's discipline alone, no matter how profound. The brain of the student arriving in a new education is not virgin, even if he has never tackled the slightest question of what he is going to learn there. He has or will spontaneously have (modes of) representation which will perturb his capacity to construct knowledge or more

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accurate methods. Teaching thus consists of accompanying the student in successive cycles of deconstruction of erroneous representations to enable the construction of correct representations. This is a long, iterative process in which different representations generally coexist. The identification of erroneous representations, epistemological obstacles and the ability to direct students towards relevant examples in order to deconstruct and reconstruct representations or to put them to the test requires the teacher to have a solid grasp of the didactics of his or her discipline. The didactics of a discipline cannot be improvised, even when one has a deep and solid mastery of one's own discipline. It also needs to be learned and tested. Academic rigour is at stake: the most tried and tested knowledge or methods can only be deeply and durably acquired by a student if they are taught with great didactic dexterity.

Also, the teacher remains a human model who will deeply influence the student by his rigour, his seriousness, his courage, his culture, by the depth he shows in his reflections and in general in the values he transmits voluntarily or not. The values and behaviour of the teaching staff will have a profound influence on the students. They cannot be completely distinguished from the more "academic rigour", especially in professions such as engineering where thinking about the application of knowledge is as important as the knowledge itself.

Finally, it is important to move away from traditional transmissive modes of teaching where the "on-table" assessment of the student involves many implicit assumptions (what to take away from the lecture or tutorials, what to write and how to write it, etc.) that are essential for success. In such cases, a selection of students who understand the implicits of the teaching and assessment framework in particular is carried out, which is a form of behaviourism. Well-selected students know how to behave in order to continue to succeed, which guarantees rather comfortable success trajectories for the teacher and the institution. However, they do not fully guarantee an in-depth acquisition of the lessons, but a capacity of restitution according to given codes. The quality of the training is also diminished in terms of the "job to be passed on". These transmissive methods with standardised assessments that are not based on contextualised learning outcomes thus lead to heterogeneous and non-guaranteed quality learning, which runs counter to the expected academic rigour.

From the bid:

Objectives of the proposal	***Indicators:*** *List relevant quantitative and qualitative indicators showing whether and to what extent the objectives of the alliance are being achieved. Please indicate your target where possible.*	***Source of information:*** *How could these indicators be measured? - What could be the sources of information?*	***Assumption and risks:*** *What might be the factors and conditions not under the direct control of the alliance which are necessary to achieve these objectives? What risks have to be considered?*
Academic freedom and integrity	Satisfaction of academic and student teams	Return of external solicitations and audits	External factors explicitly or implicitly limiting freedom of expression and ethical conduct

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2.9 Interdisciplinarity

Interdisciplinarity gives students the awareness that complex problems require a synergy of very different disciplines to be tackled, and the competence to do so.

There is always a big pitfall: for some people, interdisciplinarity means mixing mechanics and thermodynamics!

The competences of the degree are structurally interdisciplinary, they are even transdisciplinary: the spontaneous running of the world has little to do with disciplinary breakdowns. The student must be able to:

- combine different disciplinary elements in order to solve a problem that links issues from different disciplines
- deal with a problem in which no part is reducible to disciplinary elements, where each element is thus inherently complex.

It is not advisable to ask the student to do this exercise at the very end of the curriculum, as it takes a long time to learn to decompartmentalise. Moreover, the student cannot do it alone, bearing the burden of decompartmentalisation which is not carried out by the teachers.
Interdisciplinarity cannot be addressed only during projects, internships or interdisciplinary activities. It is all teaching, without exception, that is concerned.

It should be understood that the level of interdisciplinarity is induced by the real problems that our graduates will have to solve during their professional career and their civic life. Graduates of higher education will have to tackle problems in which “hard” science issues will be inseparable from technical issues, humanities and social science issues as well as ethical, environmental or financial issues. This level of interdisciplinarity will necessarily have to be progressively achieved during the course of the curriculum. Thus, the courses themselves must address interdisciplinary complexity at a gradual level adapted to the student’s progress. From the very beginning of the course, the traditional compartmentalisation of teaching between traditionally related subjects should vanish and offer as many bridges as possible. Gradually, the disciplines will no longer be simply connected and decompartmentalised, but will usefully deal with pedagogically adapted problems so as to bring students into a depth of thought that combines the solidity of the disciplinary knowledge and the complexity of real problems.

Narrative

“After long conversations about the possibility of flexibly modulating courses, Robyn is convinced that interdisciplinarity is a ‘must’: today’s societal challenges require the complementarity of different disciplines as any competences blend most of them. She chooses

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her classical technological courses, mixing technological engineering with courses on applied ethics and sustainable sciences. The objective, she thinks, is to bring different modules together that are thematically connected, in line with her professional project. By the interdisciplinarity of her courses, Robyn will learn to think human first and be conscious of her environment, to become a technologically responsible and aware citizen. '

2.10 Exposure / engagement with research

Exposure / engagement with research means raising students' awareness of research methods and results in various ways according to their level and ambitions.

The student must be aware of the existence of research, its role, what it allows but also what it does not allow, its diversity, and, depending on his/her level, be introduced to methodologies. They must also clearly distinguish research from innovation.

This can be done in different ways, depending on the field, level or aspirations of the student. However, we are aware that a simple visit to a research laboratory or a project lasting a few hours does not do much in this respect. A discussion on the role of research and its methods is necessary.

EUt+ Bachelor

During the Bachelor's degree, all students are given an introduction to research and an overview of its role. This discovery takes various forms during the course, as not all students are equally receptive at the same level.
The most motivated students can, in one way or another, participate in a research activity to deepen their insight.

EUt+ Master

A substantial period of time will be spent on an R&D issue, in the public or private sector, in an appropriate manner. This is expected to provide an introduction to research methods and an awareness of its importance.
In the case of graduate schools, exposure to research is permanent, as the lab it is the central place for the student.

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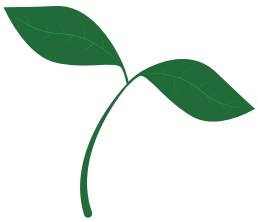
Quality processes

In Master of Engineering, exposure to research is usefully the subject of a learning outcome or elements of a learning outcomes.

2.11 Civic engagement



Civic engagement
discards the concept of elitism confined to an 'Ivory Tower' and holds that there is no relevant science without conscience.

It concerns both the public and the major societal and fundamental issues, calling for a very strong secularisation of teaching.

The graduate student must be aware of his role in the world. They are trained to be aware of their role and duty on the external world, not just to take selfish advantage of opportunities. Graduates must be responsible, with a strong civic awareness and critical thinking.
Civic engagement is not a philanthropic micro-activity where a (future) elite meets the rest of the population in a limited setting. It is about the awareness of the role of graduates in society as a whole and, in particular, the interdependence of all its actors. The impact of human activities and especially those of technology on the environment is a major component of this civic engagement.

The learning of social and environmental responsibility, of which graduates will be important actors, is done through this civic engagement. Ethical issues are also addressed. The consequences of technology on society and the environment are often indirect: during their civic commitment, graduates will realize this complexity, which should lead them to consider carefully the issues at stake in the tools they will be developing.

Civic engagement provides learning opportunities that would otherwise be difficult to obtain. It also allows for an interdisciplinary approach to real issues.

Civic engagement should not compensate for an overly strong academic approach to teaching: awareness of it should be integrated into all teaching units, alongside activities that are linked to the outside world. 'Traditional' courses should be open to these issues so that students can derive the greatest benefit from these periods of engagement.

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Narrative

'During his stay, because of his civic engagement, Robyn gets involved in his local community. He learns how to interact with others outside the campus and to adapt to the different circumstances and different scenarios. Building relationships with his classmates from other EUt campuses make him become more aware of his European identity, of the importance that we are living in a society with so diverse people, and these interactions prepare him for the world of tomorrow.'

EUt+ Bachelor

In Bachelor, the commitment must allow, through various activities, an awareness of the interdependence of the various components of society and its environment.

EUt+ Master

In the Master's programme, preparing for an executive role, the student must be prepared for in-depth reflection and a proactive attitude to his/her role in society and the environment. In particular, he/she integrates the notions of sustainable development and social responsibility into all his/her activities with the required proportion.

Quality processes

Civic engagement contributes to learning outcomes, validated on the demonstration of these outcomes and not only on the time spent on such an activity. Competences include this dimension.

2.12 Alignment with future labour market needs

Alignment with future labour market needs enable students to be very flexible and anticipatory in a job market and competence expectation that will change dramatically in the coming decades

The issue here is to enable students to keep up with drastic and unpredictable changes in skill requirements, because it will not be possible to train tens of millions of adults en masse when professions are going to change dramatically, without being able to foresee anything about this now.

In technological curricula, the alignment with the past and present labour market is generally very good. It is more difficult when it comes to anticipating general developments. Alignment with the future labour market requires:

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- in-depth prospective work on trends and developments, which is not exclusively fed by research trends;
- The training of students with a very good degree of polyvalence, notably based on solid scientific and technical foundations;
- The important introduction of human and social sciences in technological training, in particular to have the tools and the capacity of reflection to anticipate and follow a changing world;
- The development of strong self-learning skills;
- A taste (or at least the absence of reluctance) for disciplinary and geographical mobilities.

This alignment is not just a matter of curriculum management or syllabus choices. It is integrated at all levels of granularity, especially within the teaching. Alignment with the future labour market therefore relies in particular on the exposure, in one way or another, of the entire teaching staff to the economic activities and sectors likely to employ students.
It also requires a continuum in teaching, avoiding too much distinction between the academic and the applied.

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3 Annex: Competency framework of the European University of technology Masters of engineering

Memorandum of Understanding

Competency framework of the European University of technology Masters of engineering

The eight partners constituting the European University of Technology agree on the following general competency framework for their Masters of Engineering graduates:

Identifying, analysing comprehensively and formalising complex or multidisciplinary technical or socio-technical problems by relying on solid scientific and technical skills and knowledge.
Proposing and designing original, resilient, sustainable and reliable solutions or systems, integrating all technical, societal, human, environmental and economic constraints over the entire life cycle.
Managing a team or structure in an international, transdisciplinary and multilingual context, integrating social and legal aspects, interacting, integrating a wide variety of profiles, ensuring the integrity of the work and the expression of diversity.
Piloting a process or system reliably and efficiently; deciding, planning and organizing with a holistic vision; anticipating and preventing direct or indirect local impacts of a system on its territory, while being aware of the global challenges.
Guaranteeing a quality or validation process at all levels; carrying out a continuous improvement process; evaluating performance and margins for improvement and progress.
Exchanging, receiving and transmitting information and ideas to any trade at any level of qualification and to the civil society; assessing information; accompanying professional developments; assessing and completing training and self-training needs; self-directed learning.
Leading or supporting an innovation process and implementing original proposals, based on the state of the art and mobilising a variety of skills, proposing solutions based on an avant-garde vision; contributing to a research and development process, evolving in an uncertain and restricted technical and technological environment.

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Protocole d'accord

Compétences générales des Masters Ingénieurs de l'Université de technologie européenne

Les huit partenaires constituant l'Université de technologie européenne s'accordent sur les compétences générales suivantes pour leurs diplômés de *Master Ingénieur* :

Identifier, analyser avec une vision globale et formaliser des problèmes techniques ou sociotechniques complexes ou pluridisciplinaires en s'appuyant sur des aptitudes et une culture scientifique et technique solides.
Proposer et concevoir des solutions ou des systèmes originaux, résilients, pérennes et fiables, en intégrant l'ensemble des contraintes techniques, sociétales, humaines, environnementales et économiques sur l'ensemble du cycle de vie.
Gérer une équipe ou une structure dans un contexte international, transdisciplinaire, et polyglotte, en intégrant les aspects sociaux et juridiques, interagir, intégrer une grande variété de profils, garantir l'intégrité du travail et l'expression de la diversité.
Piloter un procédé ou un système avec fiabilité et efficience ; décider, planifier et organiser avec une vision systémique ; anticiper et prévenir l'ensemble des incidences locales directes ou indirectes d'un système sur son territoire, tout en ayant conscience des enjeux globaux.
Garantir un processus de qualité ou de validation à tout niveau, mener une démarche d'amélioration continue, évaluer les performances et marges d'amélioration et de progression.
Échanger, recevoir et transmettre des informations et des idées à tout corps de métier et tout niveau de qualification ainsi qu'à la société civile ; vérifier des informations ; accompagner les développements professionnels ; évaluer et compléter les besoins de formation et d'autoformation ; s'autoformer.
Mener ou accompagner une démarche d'innovation et concrétiser des propositions originales, s'appuyant sur l'état de l'art et mobilisant des compétences variées, proposer des solutions s'appuyant sur une vision d'avant-garde ; contribuer à un processus de recherche et développement, évoluer dans un environnement technique et technologique incertain et contraint.

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EUt+ European Degrees in Engineering

Guide de référence

V.1

*En 2017, lors du **sommet social de Göteborg**, la Commission européenne a exposé **sa vision**, à l'horizon 2025, d'un **espace européen de l'éducation** garantissant la libre circulation des apprenants : « Un continent sur lequel passer du temps dans un autre État membre — pour étudier, pour apprendre, ou pour travailler — serait devenu habituel et où parler deux langues en plus de sa langue maternelle serait devenu la norme. Un continent sur lequel les gens auraient un sens aigu de leur identité en tant qu'Européens, ainsi que du patrimoine culturel de l'Europe et de sa diversité. »*

Ce document a été établi notamment à partir des cadres européens sur les formations, des informations dont nous disposons sur les évolutions en cours, des attentes pour l'espace européen de l'éducation, des contenus de l'appel à projets *Universités européennes* et notre réponse à cet appel ainsi que des retours des ateliers participatifs EUt+.

Les exemples considérés ici relèvent très largement du domaine de l'ingénierie et des formations d'ingénieur, car elles sont majoritaires dans EUt+ et les exemples sont facilement adaptables aux autres domaines, tels que le management ou les arts.

Ce document porte sur les formations Bachelor et Master en ingénierie (tâches 3.1 et 3.2). Il ne porte pas sur les Doctorats, ni les formations de Master en graduate schools (tâche 4.1).

Chronique

Nous venons d'une génération qui a construit le monde en posant, bien souvent malgré elle, des problèmes d'une ampleur nouvelle, nous devons former la génération qui saura les aborder avec intelligence pour les résoudre.

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1 Références, définitions et glossaire

1.1 Références et bibliographie

1.1.1 Ressources externes

European Standards and Guidelines 2015:
- english
- français

Documents sur les diplômes européens de la DGEAC :
Voir annexes

Documents sur le cadre d'acquis d'apprentissage et de *learning outcomes* :
Cadre de l'ENAEE
UNESCO document on level descriptors use
"Dublin" descriptors: here, and there

Ouvrages sur la construction de formations et les référentiels de compétences :

ORGANISER LA FORMATION A PARTIR DES COMPETENCES, MARIANNE POUMAY, JACQUES TARDIF, FRANÇOIS GEORGES, DE BOECK, JUIN 2017

BERTHIAUME, D. ; REGE COLET, N. (2013). LA PÉDAGOGIE DE L'ENSEIGNEMENT SUPÉRIEUR : TOME 1 : ENSEIGNER AU SUPÉRIEUR. BERNE, SUISSE : PETER LANG.

BERTHIAUME, D. ; REGE COLET, N. (2014). LA PÉDAGOGIE DE L'ENSEIGNEMENT SUPÉRIEUR : TOME 2 : SE DÉVELOPPER AU TITRE D'ENSEIGNANT. BERNE, SUISSE : PETER LANG.

1.1.2 Ressources internes

En annexe **"Competency framework of the European University of technology Masters of engineering" / « Compétences générales des Masters Ingénieurs de l'Université de technologie européenne »**

1.2 Définitions

Compétences (pédagogiques) : « savoir agir dans un environnement complexe »

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Définition de Jacques Tardif, issue des travaux de Noam Chomsky : elle permet d'avoir un corpus de compétences très stable dans la durée, qui décrit particulièrement bien les « traits de caractère » d'un étudiant formé dans une école ou un cursus donné, qui s'adapte aux évolutions des métiers et des disciplines. Il formalise le mieux « l'empreinte digitale d'une école » au-delà de l'affective « alma mater » tout en donnant un cadre pédagogique clair pour des apprentissages effectifs et rémanents. En ce sens, le corpus de compétences pédagogiques constitue le point fixe du « contrat d'apprentissage » entre l'école/université et l'étudiant.

Exemple de compétence pédagogique (extrait des compétences pédagogiques du Master EUt+) : « Piloter un procédé ou un système avec fiabilité et efficience ; décider, planifier et organiser avec une vision systémique ; anticiper et prévenir l'ensemble des incidences locales directes ou indirectes d'un système sur son territoire, tout en ayant conscience des enjeux globaux. »
"Piloting a process or system reliably and efficiently; deciding, planning and organizing with a holistic vision; anticipating and preventing direct or indirect local impacts of a system on its territory, while being aware of the global challenges."

Acquis d'apprentissage (learning outcomes) : « à l'issue de [un acte pédagogique à déterminer], l'étudiant sera capable de [production à déterminer] »
[un acte pédagogique à déterminer] = tout acte pédagogique qui peut être une séquence de 2h de cours magistraux, un semestre complet, un projet ou une période en entreprise
[production à déterminer] = toute capacité que l'étudiant aura acquise pour autant qu'elle soit définie avec précision, qui peut être « exprimer le gradient dans les trois systèmes de coordonnées courants », « décrire avec des outils mathématiques adaptés le champ de vitesse d'un écoulement hydrodynamique », ou « avoir le niveau C1 en allemand ».

Pour des raisons pratiques, on est souvent amené à distinguer (extrait du kitmap Université de Nantes) :

- Les acquis d'apprentissage spécifiques *(specific learning outcomes)*
- Les acquis d'apprentissage élémentaires *(basic learning outcomes)*
- Les acquis d'apprentissage terminaux *(final learning outcomes)*

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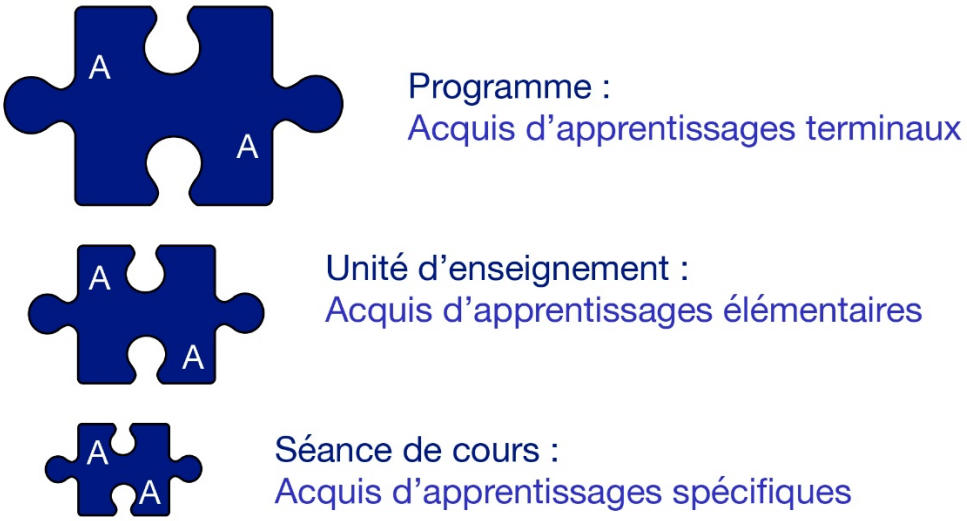
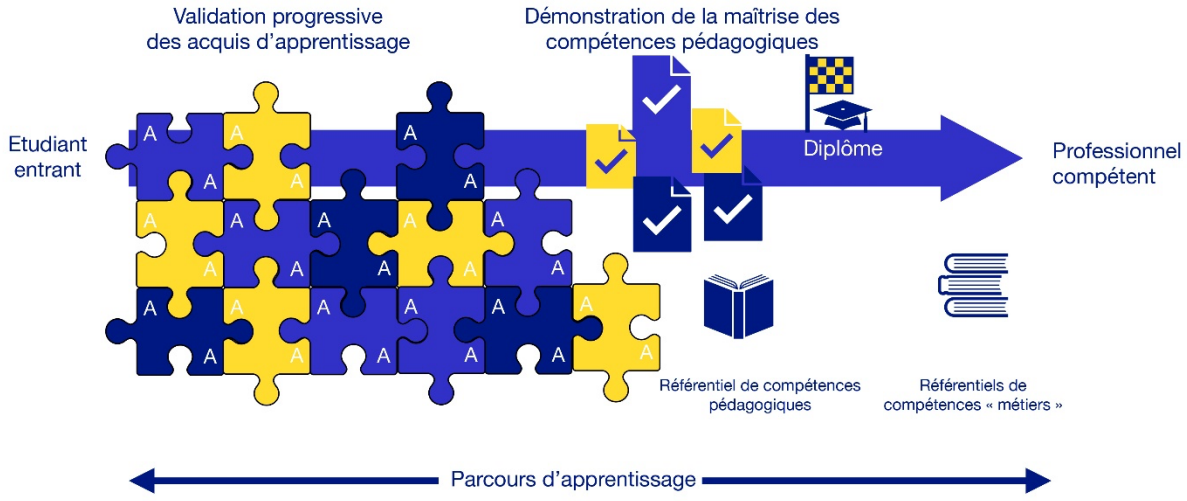


Typologie des acquis d'apprentissage

Ceci se structure pédagogiquement de la manière suivante :



Articulation entre compétences et acquis d'apprentissage

D'après D. Lemenu et E. Heinen (2015) dans « comment passer des compétences à l'évaluation des acquis »

Dans le cadre des diplômes européens de l'EUt+, les programmes cibles sont définis en acquis d'apprentissage terminaux. Ils sont la déclinaison précise des *compétences pédagogiques* pour chacun des diplômes.

Les descriptions des unités d'enseignement (ou modules ou ce qui constitue la plus petite unité échangeable) seront faites par acquis d'apprentissage élémentaires. On trouvera

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généralement de l'ordre d'un acquis d'apprentissage élémentaire par ECTS (ou un peu moins). Ceci est la base de discussion entre enseignants.
Le cadre du diplôme est décrit par acquis d'apprentissage terminaux. On en trouvera généralement de l'ordre de 15 à 20 pour un Bachelor en ingénierie et environ 25 (ou un peu plus) pour un Master en ingénierie (dans ce cas, les acquis d'apprentissage du Master engloberont, explicitement ou non, les acquis du Bachelor).

1.3 Principe générique du cursus d'un apprenant

Selon les définitions précédentes, le principe du cursus d'un apprenant est le suivant :

- Un apprenant est admis dans le cursus, car
  - Il dispose d'acquis d'apprentissage obtenus par sa formation et son expérience antérieure
  - Il montre une capacité à acquérir les acquis d'apprentissage nécessaires pour le diplôme
- De diverses manières, il collecte les acquis d'apprentissage élémentaires pour valider progressivement les acquis d'apprentissage terminaux.
- Lorsqu'il a validé tous ou presque tous les acquis d'apprentissage terminaux, au moyen d'une ou plusieurs phases de mise en situation, il montre sa capacité à les mobiliser, validant ainsi les compétences pédagogiques.

Chaque étape de cette trajectoire est accompagnée par les enseignants, chargés de guider l'apprenant, notamment selon ses prérequis puis les acquis validés et les choix qu'il souhaite. L'auto-évaluation et l'*e-portfolio* sont des outils essentiels de l'acquisition de l'autonomie de l'apprenant et du dialogue avec les enseignants.
Les enseignants valident notamment les compétences finales, qui doivent être appréciées dans des contextes plus ou moins complexes.

1.4 Trajectoire de convergence des diplômes

Les diplômes actuels convergent vers les diplômes européens grâce :

- À la progression de chacun des diplômes existants vers les principes et les schémas généraux décrits ci-dessous ;
- Aux acquis d'apprentissage terminaux qui permettent de dessiner ce que sera le « programme commun », identique pour tout étudiant, rendant compatibles les offres locales.

Extrait de notre dossier de candidature :
Chaque groupe de programmes (*cluster*) progressera selon le schéma en trois phases :
(1) gestion harmonisée ; (2) gestion décentralisée ; (3) gestion déconcentrée.

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	Phase 1	Phase 2	Phase 3
Gestion du programme	Harmonisée	Décentralisée	Déconcentrée
Règlement(s) des études	Compatibles pour la mobilité	Identiques	Unique
Pilotage	Collaboratif	En réseau	Unique, avec subsidiarité pour le fonctionnement
Diplôme	Un par campus, même domaine	Un par campus, diplôme identique ou conjoint selon la réglementation nationale.	Un seul pour l'EUt+
Durée estimée de la phase	1 an	2 ans	2 ans, selon la législation

Chaque nouveau cursus sera construit à partir d'un groupe de cursus préexistants de 3 à 5 campus.

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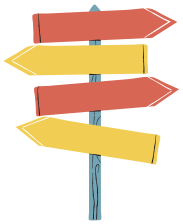
2 Les douze caractéristiques du diplôme européen déclinées pour les diplômes d'ingénieur Bachelor/Master EUt+

2.1 Mobilité intégrée / *Embedded mobility*



On parle de **mobilité intégrée** lorsqu'une ou plusieurs périodes substantielles de mobilité sont la condition indispensable à l'obtention d'un diplôme et que le cursus est intrinsèquement délocalisé. L'exception est l'absence de mobilité longue ou majoritaire dans un cursus.

Nos étudiants, pour se construire et construire leur vision de l'Europe, ont besoin de *rencontres et d'immersions profondes*. Elles ne peuvent se faire que par des *mobilités longues et transformantes*.

La mobilité n'est pas une fin en soi, elle est juste une nécessité pour découvrir l'autre et la culture des autres, et également pour se découvrir.

La mobilité est donc une manière d'être plus qu'une action de déplacement géographique. Pour les diplômes européens EUt+, les étudiants sont accompagnés vers cet état d'esprit qui les mène à la rencontre des autres cultures dans la durée. Ils se déplacent au minimum sur plusieurs mois, idéalement sur un semestre complet. Ils suivent les enseignements dans le campus d'accueil aux côtés des étudiants locaux, et avec d'autres étudiants en mobilité.
En ce sens, une mobilité courte n'a pas de sens, une mobilité dans une *lingua franca* en a peu. La rencontre se passe lors des enseignements, lors du travail personnel, mais aussi et surtout lors des rencontres informelles hors périodes d'enseignement.

Les mobilités courtes, de quelques jours ou quelques semaines ne sont pas soutenues ni prises en compte pour les diplômes européens, car elles n'apportent pas la profondeur nécessaire à l'immersion. De plus, elles généreraient un impact carbone trop important pour peu de temps, pour le seul bénéfice de pouvoir dire qu'on a brièvement posé le pied ailleurs en Europe. Elles ne permettent pas le temps de l'immersion dans la culture de l'autre, pas le temps de la rencontre profonde.

La mobilité virtuelle, oxymore par essence, ne doit pas servir de cache-nez à une absence de mobilité. L'immersion est une rencontre, le virtuel ne permet pas une vraie rencontre. Cependant, après des rencontres et des liens tissés entre étudiants, les visioconférences et

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outils de travail en commun à distance permettent de poursuivre des relations. Le virtuel est utilisé comme outil pour prolonger une rencontre. Il est également utile pour préparer une mobilité (apprentissage des langues, etc).

Extrait de notre dossier de candidature :
La mobilité doit être financièrement viable, simple, motivante et pédagogiquement intégrée. En tant que telle, la mobilité sera presque exclusivement d'une durée d'un semestre ou plus, afin de permettre une réelle immersion dans l'institution partenaire, dans la culture et la langue locale, et d'amortir son empreinte carbone.

Extrait de notre dossier de candidature :
Tout d'abord, il convient de noter que le cadre européen harmonise les niveaux B, M et D dans l'EEES, et les caractérise par les descripteurs de Dublin. Il n'harmonise pas le niveau de sortie des lycées. Ainsi, la différence existante entre les Bachelors d'une durée de 6 et 8 semestres sert principalement à aligner les niveaux de compétences sous la forme d'une *étape propédeutique* de durée variable afin d'atteindre finalement le même niveau réel de compétences.

Chronique

"À la fin de son cursus, elle aura appris à mieux se connaître, à avoir confiance en elle, et elle est désormais capable de construire son propre parcours professionnel. Cette expérience sur un autre campus de l'EUt+ a été très enrichissante, tant en termes de résultats d'apprentissage que d'expérience de vie, et lui a permis de mûrir. L'expérience a été très positive, car même la "mobilité" a été assez facile, en fait. Elle s'est sentie chez elle sur ce campus étranger de l'EUt+. La communauté universitaire était bien préparée à l'accueillir et tout s'est déroulé sans heurts : elle a obtenu une bourse Erasmus, n'a rencontré aucun problème de logement, sa carte d'étudiant européenne lui a permis de prendre facilement les transports en commun, d'aller au restaurant universitaire et même d'emprunter des livres.
Tout ce que Robyn a appris et vécu pendant ce semestre lui a donné l'envie et la force de demander un autre semestre, cette fois à Dublin."

EUt+ Bachelor

La mobilité longue pour un jeune étudiant en début d'études, ou s'il rencontre un passage difficile, peut être un frein pour s'inscrire dans un cursus. Dans les cursus qui concentrent ces étudiants plus fragiles, un déplacement d'un semestre complet, encadré, préparé et en groupe permet d'offrir une immersion plus progressive en réduisant l'appréhension. La mobilité est donc proposée comme un déplacement pour un semestre complet, avec une liste d'enseignements prévalidée, proposée dans la continuité des enseignements déjà suivis dans

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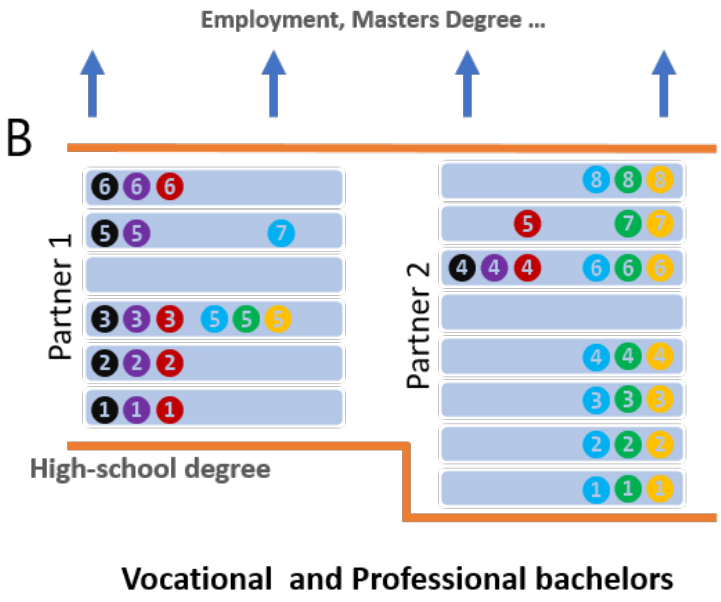
le cursus. Il s'agit donc, de fait, d'un cursus linéaire avec un semestre proposé dans un autre site, où l'immersion se fait en groupe.

Extrait de notre dossier de candidature :



Pour les licences en ingénierie, avec des groupes plus vulnérables pour lesquels la mobilité est moins aisée et l'employabilité est avant tout perçue comme locale, nous adoptons des structures plus rassurantes pour les étudiants. Ils se déplacent en groupe pour un semestre spécifique chez un autre partenaire, selon un programme prédéfini, lorsqu'ils sont globalement prêts sur le plan linguistique et pédagogique. Des mobilités individuelles supplémentaires sont possibles pour les étudiants les plus motivés (exemples cyan et rouge). Les diplômes correspondent à un schéma global de compétences qui est harmonisé au niveau de l'EUt+, mais décliné localement en fonction de l'environnement de chaque partenaire.

EUt+ Master

Dans le schéma de formation 'Master' qui intègre éventuellement les 'Master full track', donc la partie Bachelor, la mobilité est totalement intégrée. Dès que l'étudiant est prêt pour la mobilité (validé par les enseignants, à l'issue de 2 ou 3 semestres généralement), l'étudiant suit librement sa scolarité en suivant les enseignements sur les différents campus. Seule la cohérence pédagogique des enseignements est prise en compte.

Extrait de notre dossier de candidature :
Pour les Masters (2 ans ou parcours direct), les cursus seront entièrement communs.
Dès que la phase initiale est passée, les étudiants sont libres de choisir leur parcours en fonction des acquis qu'ils souhaitent acquérir, des partenaires qu'ils souhaitent visiter et des détails de l'offre.

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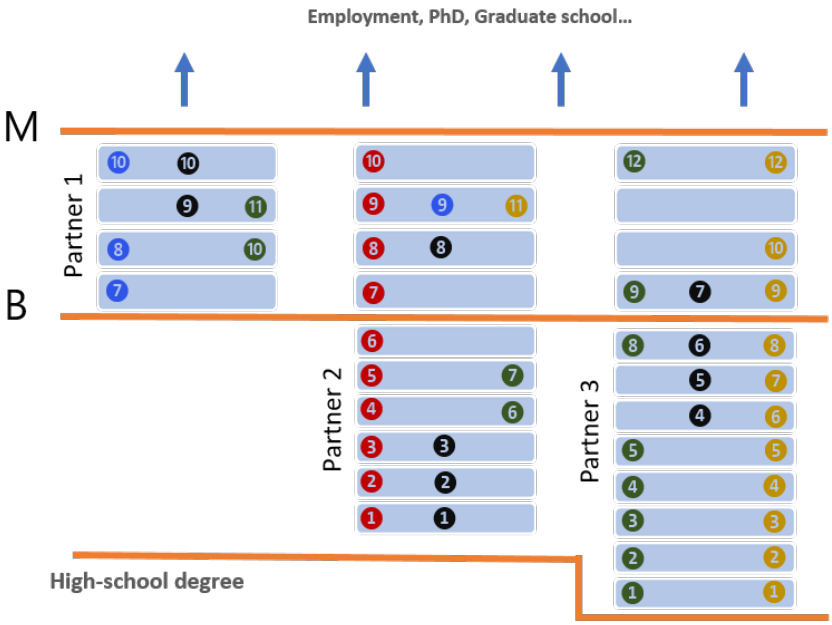

Master of engineering
(2 years or direct curricula)

Le parcours de mobilité minimal est représenté en bleu ou en jaune (un semestre). Les itinéraires verts et noirs correspondent à ce que nous espérons être la majorité à long terme. Au terme du processus de convergence complet, le parcours en rouge ne devrait être une exception que pour les étudiants dont les difficultés ne leur permettent pas la mobilité (il n'aboutira qu'au diplôme national et non au diplôme européen que nous visons à long terme). Grâce à une *démarche compétences* et une *approche programme* développées par toutes les équipes du groupe des cursus convergents, un cadre unique d'acquis d'apprentissage est établi et partagé pour chaque cursus cible du Master en ingénierie. Le même règlement académique (unique) sera appliqué sur tous les campus.

Qualité et process qualité

Extrait de notre dossier de candidature :

Objectives of the proposal	***Indicators:*** *List relevant quantitative and qualitative indicators showing whether and to what extent the objectives of the alliance are being achieved. Please indicate your target where possible.*	***Source of information:*** *How could these indicators be measured? - What could be the sources of information?*	***Assumption and risks:*** *What might be the factors and conditions not under the direct control of the alliance which are necessary to achieve these objectives? What risks have to be considered?*
• Multiculturalism	• Share of EUt+ students who will have spent at least one semester at one of the EUt+ campuses • Efficient communication and daily running of EUt+ Efficient communication at	Multiculturalism and multilingualism overseeing committee reports (quality management, Task 1.3)	• Financial resources Specific local constraints limiting mobility

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	meetings involving representatives from different campuses		

2.2 Multilinguisme/ Multilingualism

Le **multilinguisme** est la capacité à rencontrer les autres dans leur propre langue et que les échanges internationaux ne se réduisent pas à une seule *lingua franca*, ouvrant ainsi la richesse de la grande diversité des langues et des cultures.

Le préambule Erasmus rappelle que tout Européen ayant validé un diplôme d'enseignement supérieur devrait disposer de deux langues de travail européennes en plus de la sienne. Le multilinguisme ne signifie donc pas avoir sa langue maternelle à la maison et une langue véhiculaire unique pour les études et le travail, servant de lingua franca. Il consacre l'ouverture à une diversité de langues, autant dans l'apprentissage que dans le travail.

Le principe fondamental concernant les langues EUt+ est que la diversité linguistique est une richesse, qu'il n'y a pas de langue plus noble et qu'une langue native ne doit pas fournir de désavantage *a priori*. En corollaire, on s'efforce de rencontrer l'autre dans sa langue et non dans une *lingua franca.*

Rappel des objectifs fixés dans la candidature EUt+ et les objectifs de l'Union européenne, afin de maintenir la diversité linguistique, notamment pour la mise en œuvre des cursus d'études :

- Chacun des partenaires dont la langue est la plus répandue (anglais, français, allemand et espagnol) enseigne dans sa langue nationale ;
- En conséquence, chaque partenaire prépare ses étudiants à suivre un enseignement dans d'autres langues sur les autres campus et se prépare à accueillir sur son campus des étudiants ayant un niveau de compétence plus faible dans sa langue nationale. En particulier, des cours de soutien linguistique sont organisés en début ou en cours de semestre ;
- Chacun des partenaires dont la langue est moins répandue (bulgare, grec, letton et roumain) propose des cours dans d'autres langues aux étudiants en mobilité entrante ;
- Les étudiants en mobilité avec des partenaires linguistiques à faible diffusion sont tenus de suivre un cours dans la langue nationale du partenaire d'accueil à un niveau A1 en un semestre et A2 en deux semestres ;
- Les langues peu répandues sont promues autant que possible parmi tous les partenaires ;

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- Chaque partenaire impose progressivement la maîtrise d'une langue étrangère européenne au niveau de la licence et de deux langues étrangères européennes au niveau du Master et du Doctorat ;
- Un accent particulier est mis sur l'ouverture du personnel (académique et non académique) à la diversité linguistique et à sa pratique ;
- En général, on fait preuve d'une attitude bienveillante à l'égard du développement des compétences linguistiques, notamment lors de situations de travail en commun ;
- Ces dispositions linguistiques ne s'opposent pas au développement de l'apprentissage d'autres langues européennes ou non-européennes.

Un observatoire linguistique est indiqué dans la candidature et un soin particulier est apporté à son bon fonctionnement et à la prise en compte de ses conclusions.

Extrait de notre dossier de candidature :
Nous encourageons vivement le multilinguisme. Sur nos campus, 9 des 24 langues officielles de l'UE sont parlées, et les trois alphabets de l'UE sont utilisés. Nous exploiterons cette richesse linguistique et culturelle pour travailler à la réalisation d'objectifs ambitieux. D'ici 2025 :

- Les étudiants ayant obtenu un diplôme de premier cycle maîtriseront au moins une langue étrangère au niveau B2. Au moins 30% d'entre eux auront bénéficié d'une mobilité physique et au moins 50% d'une mobilité virtuelle ;
- Les étudiants qui obtiennent un Master (ingénierie ou autre) maîtriseront au moins deux langues étrangères au niveau B2. En régime permanent, au moins 80 % des étudiants auront effectué une partie de leur cursus à l'étranger.

Notons que l'EUt+ est loin d'être l'Alliance la plus ambitieuse dans ce domaine. Dans l'Alliance ERUA (European Reform University Alliance), l'Université Paris 8 a ouvert des cours de danois et de bulgare (l'allemand et le grec y étaient déjà enseignés depuis longtemps). Par conséquent, nous estimons l'objectif réalisable.

Il est important de faire comprendre aux étudiants que le monolinguisme n'ouvre pas suffisamment à la culture de l'autre, sur sa manière de penser. L'anglais seul ne permet pas non plus de trouver un travail dans un pays non anglophone où la maîtrise de la langue nationale s'avère presque toujours nécessaire, et plus encore pour s'intégrer.

Chronique

"En regardant les cours qui lui permettraient de valider les compétences qu'il recherche, il voit qu'ils sont disponibles à Cluj et à Dublin. Il choisit d'aller d'abord à Cluj, parce qu'il connaît déjà l'anglais. L'apprentissage du roumain semble être un défi plus intéressant en terme d'opportunité interculturelle.
Il décide de quitter son pays d'origine seul, sans camarades de classe, afin de s'immerger pleinement dans cette nouvelle culture et cette nouvelle façon de vivre."

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EUt+ Bachelor

Dans le Bachelor EUt+, l'acquisition d'au moins une langue étrangère au niveau B2 est requise. Elle sera notamment nécessaire pour le semestre de mobilité. Cette langue sera généralement l'anglais. En vue de la poursuite en Master, l'acquisition d'une seconde langue à un niveau intermédiaire en Bachelor est plus que recommandée. Ceci permettra aussi d'ouvrir le champ des mobilités.
Ce faisant, nous restons en deçà des attentes européennes qui demandent deux langues de travail européennes en plus de sa langue native pour les diplômés de l'enseignement supérieur. Néanmoins, nous pensons qu'il s'agit d'une première étape utile, qui constitue déjà une amélioration par rapport à la situation actuelle, et qui générera des connaissances en vue d'une amélioration itérative.

EUt+ Master

Détail
Au niveau Master, il est attendu la maîtrise de deux langues étrangères européennes au niveau B2. L'approfondissement d'une de ces deux langues au niveau C1, voire C2, sera presque toujours obtenu, suite aux mobilités déjà vécues lors du Bachelor.

Extrait de notre dossier de candidature :

Objectives of the proposal	***Indicators:*** *List relevant quantitative and qualitative indicators showing whether and to what extent the objectives of the alliance are being achieved. Please indicate your target where possible.*	***Source of information:*** *How could these indicators be measured? - What could be the sources of information?*	***Assumption and risks:*** *What might be the factors and conditions not under the direct control of the alliance which are necessary to achieve these objectives? What risks have to be considered?*
Multilingualism	All bachelor students will have a certified B2 level in one foreign language All Master students will have a certified B2 level in two foreign languages Meetings between students of EUt+ will take place in several languages Meetings between EUt+ faculty and/or administrative staff will take place in several languages Efficient communication and daily functionning of EUt+	External official language tests Multiculturalism and multilingualism committee observation reports (quality management, Task 1.3)	Local and/or national and/or European higher education support Financial resources Specific local constraints limiting mobility

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2.3 Personnalisation du parcours / *Self-customization of study track*

La **personnalisation du parcours d'études** est la possibilité pour tous les étudiants de choisir leur propre cheminement pédagogique pour atteindre les acquis d'apprentissage nécessaires pour le diplôme souhaité.

Le choix des cours ne vient pas d'une vision simplement plus permissive de la formation « au menu » ou « à la carte ». Il a une origine profonde qui doit être comprise préalablement à sa mise en œuvre pour ne pas faire d'erreur de fond.

Un diplôme est la preuve attestée par un établissement d'enseignement supérieur de compétences (pédagogiques) qui permettront un degré donné d'autonomie professionnelle, et éventuellement citoyenne. On entend ici les *compétences* au sens de Jacques Tardif, c'est-à-dire « un savoir agir en environnement complexe », car elles sont profondément structurantes pédagogiquement en assurant notamment une rémanence et une adaptabilité des apprentissages. Les compétences sont la marque profonde, l'empreinte digitale de l'institution qui a diplômé. Elles reposent sur un jeu de valeurs sous-jacent, et elles caractérisent l'approche et l'évolution professionnelle des diplômés. Même dans un monde qui change vite, avec des techniques rapidement obsolètes, ou des diplômés qui changent de voie professionnelle, les compétences restent stables dans la durée. On comptera généralement 3 à 5 compétences pour un Bachelor, et 5 à 7 compétences pour un Master.

Il est important de retenir qu'une compétence constitue un savoir-agir autonome, dans le sens où il contient l'ensemble des éléments nécessaires à sa réalisation. Il est donc rare qu'il y ait des compétences purement scientifiques et d'autres purement techniques ou purement « comportementales ». Un ingénieur, ou même tout professionnel, aura besoin de mobiliser tous ces éléments simultanément pour la réalisation effective d'une tâche. Ceci se ressent d'autant plus fortement que le niveau de qualification est élevé : les métiers de cadre demandent une approche générale des problèmes, à la différence de métiers très techniques et spécialisés issus de formations professionnelles de l'enseignement secondaire.

Par contre, leur mise en œuvre pédagogique passe par une liste d'acquis d'apprentissage que le diplômé doit maîtriser indépendamment, et qu'il doit apprendre à mobiliser utilement dans une situation complexe. Un acquis d'apprentissage peut être défini comme « la capacité de l'étudiant à faire [ceci] à l'issue [d'un élément de formation] ». Pour un diplôme, la liste d'acquis d'apprentissage terminaux est suffisante. Elle peut utilement être précisée par des acquis d'apprentissage élémentaires, non contraignants, mais permettant d'aider à la construction du parcours. Ces acquis d'apprentissage sont assez flexibles, s'adaptent

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régulièrement à l'évolution des techniques, de l'économie et de la société. C'est, d'une certaine manière, l'instanciation concrète des compétences à un moment donné. Selon le degré de granularité choisi et le mode de description, on pourra dénombrer un acquis d'apprentissage terminal pour 5 à 15 ECTS. Il pourra être très précis (eg. *Valider un niveau C1 en anglais*), plus ouvert (eg. *Valider un niveau C1 dans une langue étrangère européenne*) ou très souple (eg. *Décrire avec pertinence les relations structures-propriétés pertinentes d'un matériau*).

Une liste de cours à valider ne garantit pas les acquis d'apprentissage pour de multiples raisons (compensation partielle des enseignements, structure générale non adaptée au cas particulier de chaque étudiant, contenus des enseignements décidés localement sans cohérence globale…). La modularité et la flexibilité sont ici données à l'étudiant pour progresser sur les acquis d'apprentissage à valider, selon les moyens qui sont mis à sa disposition (enseignements formels, autres enseignements dispensés ailleurs ou à l'étranger, préalables, projets, stages, engagement associatif ou autres…). Ce qui compte est que l'étudiant valide l'ensemble des acquis d'apprentissage d'une manière ou d'une autre et, qu'avant le diplôme, il ait pu prouver sa capacité à les mobiliser pour agir dans plusieurs situations complexes propres au métier du jeune diplômé.

Loin d'une liberté de choix totale laissée à l'étudiant, la construction sur mesure du parcours est une « co-responsabilisation » de l'étudiant avec un enseignant-référent pour la validation de l'ensemble des acquis d'apprentissage terminaux. Ainsi, aucun cours n'est formellement obligatoire, mais aucun acquis d'apprentissage ne peut être évité et la démonstration finale de la mobilisation des acquis d'apprentissage terminaux en situation complexe doit être effectuée par l'étudiant.

La flexibilité de construction du parcours est intrinsèque à cette approche. Elle commence dès le premier jour (chaque étudiant, même s'il a un niveau moyen suffisant, arrive avec des acquis d'apprentissage différents sur lesquels il faut construire). Elle permet à chacun un chemin plus ou moins différent, et autorise des séjours à l'étranger sans qu'ils soient une dérogation de fait, car ils devront simplement contribuer à la progression vers la validation complète des acquis d'apprentissage finaux.

Le suivi de ces acquis demande que chaque enseignement soit lui-même décrit en acquis d'apprentissage élémentaires (environ un acquis d'apprentissage intermédiaire par ECTS) permettant le suivi de l'étudiant. Le cheminement de l'étudiant est suivi utilement via un e-portfolio, trace et anticipation pédagogique du parcours de l'étudiant, consultable notamment par les enseignants-référents, et véritable fil d'Ariane pour le parcours pédagogique.

Cette responsabilité (accompagnée et surveillée) accordée à l'étudiant permet notamment :

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- Une responsabilisation plus forte de l'étudiant face aux enseignements qu'il aura choisis ;
- Un choix à un moment souvent plus favorable pédagogiquement pour l'étudiant qui choisit plus spontanément les enseignements lorsqu'il est prêt ;
- Une liberté de mouvement géographique (et temporelle).

La notion de redoublement disparaît (mais pas la possibilité de suivre deux fois une unité d'enseignement). Certains étudiants peuvent aller très vite, et valider plus de 60 ECTS par an, alors que d'autres seront plus lents (selon la disponibilité temporelle ou intellectuelle de l'étudiant), ceci pouvant aussi varier dans le temps.
L'expérience montre que les étudiants ont un comportement très mûr face à ce système qui ne génère pas de dérive majeure et que la durée de diplomation n'est pas substantiellement augmentée. Par contre, on observe de nombreux doubles-diplômes spontanés et des parcours intéressants ou originaux.

Chronique

" Elle a besoin de savoir quelles sont ses possibilités dans la structure EUt+ : les choix disponibles, les crédits, la progression des cours... Avec l'aide de ses enseignants, elle identifie les compétences et les acquis d'apprentissage qui lui manquent pour que sa formation soit complète ".
Parce que le développement durable est l'un des enjeux majeurs de la société actuelle et que les campus EUt+ sont en avance sur la question, Robyn peut choisir ses cours sur ce sujet dans différentes universités EUt+ et choisir ce qui lui convient le mieux dans chaque campus, et ainsi concevoir son propre parcours d'études."
"Robyn souhaite progressivement acquérir plus d'autonomie et elle se réjouit de bénéficier de moyens et de ressources d'apprentissage d'excellente qualité, qui lui permettent de suivre son propre programme à son propre rythme, dans le respect de ses objectifs personnels. De cette façon, Robyn est en mesure de gérer son temps plus efficacement et de tirer le meilleur parti de son séjour, en assimilant divers aspects des coutumes, des traditions et du mode de vie locaux."

EUt+ Bachelor

Le modèle de Bachelor EUt+ laisse une petite marge aux étudiants pour définir ce dont ils ont besoin. Il repose sur la pleine application du processus de Bologne.
Autour d'un noyau commun à tous les étudiants :

- Le niveau initial des étudiants est assuré en vérifiant leurs acquis d'apprentissage initiaux. Les lacunes sont comblées, les acquis déjà démontrés les dispensent des enseignements relatifs. On ajuste ainsi le niveau en entrant.

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- Des acquis d'apprentissage peuvent être obtenus lors d'expériences en entreprise, d'activité associative ou autres. Dans ce cas, ils sont démontrés par l'étudiant et validés par les enseignants.
- Lors d'un séjour en mobilité, ou lors du choix d'enseignements qui ne sont pas proposés dans le cursus, les acquis d'apprentissage sont reconnus sans restriction ni contrainte s'ils correspondent à une trajectoire pertinente vers les acquis d'apprentissage finaux du diplôme.
- Des systèmes de choix permettent diverses modalités d'acquisition des compétences.

EUt+ Master

Détail

Le schéma de formation est totalement basé sur le principe générique qui demande :

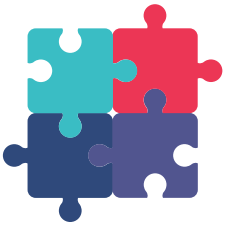
- Un parcours libre où l'étudiant valide progressivement des acquis d'apprentissage basiques qui couvrent *in fine* les acquis d'apprentissage terminaux du diplôme ;
- La preuve d'une validation des compétences lors d'une expérience approfondie, en entreprise, sur un projet réel, ou en laboratoire de recherche ;
- Un accompagnement par un enseignant référent qui guide l'étudiant lors de ses choix ;
- Un parcours à travers l'Europe où au moins un semestre en mobilité a été effectué lors du Master et un autre lors du Bachelor (ou deux lors du Master, si ça n'a pas été le cas lors du Bachelor) ;
- Le parcours est consigné et suivi dans un e-portfolio.

Certains enseignements ont des prérequis ou des conditions préalables pour être suivis. Ces conditions sont cependant réduites au minimum pédagogique nécessaire.

Pour aider l'étudiant, des parcours-types sont proposés, mais ils n'ont aucun caractère prescriptif.

Le niveau initial de l'étudiant est évalué et éventuellement compensé, s'il manquait des acquis d'apprentissage initiaux ou s'il en avait déjà démontré par ailleurs.

2.4 Modularisation et flexibilité / *Modularisation and flexibility*



La **modularisation et la flexibilité** sont la possibilité de choisir (ou non) des enseignements à différents moments, par les étudiants de différents programmes, uniquement parce qu'ils s'inscrivent dans leurs parcours pédagogiques individuels, sans autres contraintes.

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La modularisation et la flexibilité sont des corollaires techniques nécessaires de la liberté de construction du parcours laissée à l'étudiant et la liberté de mouvement entre campus.
Elles permettent aussi une adaptation à une diversité de publics (les étudiants travaillant en parallèle de leurs études, situation de handicap…) ainsi que les parcours originaux (doubles-diplômes, compléments de formation hors spectre initial…).

La modularisation et la flexibilité posent définitivement la notion de compétences et d'acquis d'apprentissage comme cadres de la formation, car les articulations pédagogiques ne peuvent plus se faire directement entre les unités d'enseignements (qui se trouvent être des briques élémentaires largement polyvalentes et ne sont plus des subdivisions d'un parcours diplômant unique).
Notons que la rencontre d'étudiants aux profils différents dans une unité d'enseignement doit être utilement mise à profit.

La modularisation et la flexibilité entraînent la nécessité d'un suivi clair de l'étudiant, qui doit se faire au moyen d'un e-portfolio pédagogique, dans lequel il consigne son parcours associé aux acquis d'apprentissage élémentaires. L'e-portfolio est accessible à l'enseignant (dès que l'étudiant le permet), et alors les acquis d'apprentissage sont contrôlés et validés en accord avec le parcours.

Chronique

"Robyn est conscient des acquis d'apprentissage communs au diplôme et de ceux qui sont nécessaires pour qu'il réussisse son semestre. Cependant, il a quelques doutes quant à son choix de cours. Il contacte donc un conseiller qui a une vision générale de l'offre de programmes sur les campus. Ce conseiller lui donne des conseils sur les choix possibles : il est possible d'acquérir des acquis d'apprentissage similaires par le biais de différentes méthodes pédagogiques (apprentissage par la pratique, stage en entreprise, engagements en laboratoire, placement en groupe de recherche, etc.) "
" Ses camarades étudiants issus de différentes formations d'ingénieurs peuvent suivre les mêmes cours : il ne s'agit pas nécessairement de matières « STIM », mais d'un éventail diversifié de cours de sciences humaines et autres, y compris les aspects sociaux, notamment la musique et l'art, ainsi que le sport. "

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2.5 Apprentissage centré sur l'étudiant / *Student-centered learning*

L'**apprentissage centré sur l'étudiant** implique de ne plus se focaliser sur la prestation de l'enseignant, mais sur ce que l'étudiant sera finalement capable de produire comme acquis d'apprentissage. *Les programmes sont dispensés d'une manière qui encourage les étudiants à jouer un rôle actif dans le processus d'apprentissage, y compris dans son élaboration, et que l'évaluation des acquis des étudiants reflète cette approche.* (ESG 1.3)

Le student-centered learning est défini précisément dans le processus d'assurance qualité : c'est le point 1.3 des European standards and guidelines. C'est aussi le « noyau » ouvrant sur la notion de learning outcomes.

L'idée première est de se concentrer sur ce que l'étudiant sera capable de restituer de son apprentissage et non sur ce que l'enseignant aura « professé lors de son enseignement ». Ainsi la description s'appuiera sur des acquis d'apprentissage, autant au niveau de l'unité d'enseignement (acquis d'apprentissage élémentaire) que du diplôme (acquis d'apprentissage terminal).

L'ensemble des lignes directrices du point 1.3 des ESG est à considérer au niveau de chaque enseignement et du cadre global.

Les méthodes pédagogiques utilisées, pour autant qu'elles sont conformes avec l'implication de l'étudiant telle que définie dans le ESG 1.3 relève de la responsabilité et de la liberté pédagogique accordée à l'équipe enseignante. Les enseignants sont libres des méthodes employées, pour autant :

- Qu'elles placent l'étudiant au centre du dispositif d'apprentissage ;
- Qu'elles garantissent une acquisition solide et pérenne des acquis d'apprentissage ;
- Qu'elles s'adressent à l'ensemble des étudiants concernés, inclus dans leur diversité avec une réussite pour tous ;
- Qu'elles respectent les moyens alloués par l'institution ;
- Qu'elles se placent dans le cadre de l'éthos propre aux établissements et à EUt+ (ceci étant traduit explicitement dans les compétences du diplôme).

Dans ce cadre l'étudiant est évalué sur les acquis d'apprentissage. Ce qui est attendu de lui doit être montré dans un contexte énoncé préalablement.
Aucune notation numérique ne saurait traduire une évaluation claire de ces acquis qui doivent être appréciés explicitement. En effet, le caractère normatif de la notation numérique ne traduit pas clairement un acquis d'apprentissage. En donnant une illusion d'objectivité et d'impartialité, elles gomment la réelle appréciation des capacités de l'étudiant. En

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normalisant suivant des critères très souvent implicites, elles gomment la richesse de la diversité étudiante alors qu'elle est souvent bienvenue pour la suite des parcours et l'insertion professionnelle. Enfin, comme mentionné *supra*, elles traduisent généralement une capacité à s'inscrire dans un schéma d'apprentissage qui relève plus du behaviorisme, par la capacité à se conformer à un exercice à la codification implicite forte, que de la construction progressive de compétences.

Enfin, il est important de procéder à une évaluation réelle des acquis d'apprentissage, dans le contexte dans lequel ils ont été définis :

- Pas au-delà, même s'il est bienvenu de toujours « challenger » raisonnablement les étudiants et de les inciter à un approfondissement au-delà du cadre *stricto sensu* du programme ;
- Pas en deçà, que ce soit pour maintenir un taux de réussite minimum, compenser un programme trop ambitieux ou des moyens trop limités. Il faut aussi prêter attention aux évaluations qui demandent à l'étudiant de proposer des réponses à des questions bien trop préparées, qui n'interrogeraient alors pas l'appropriation réelle des acquis.

Les travaux sur ce sujet ont montré que la rémanence des apprentissages passe largement par la métacognition et en particulier par les capacités montrées par l'étudiant :

- D'auto-évaluation
- D'identification des savoir-faire

L'auto-évaluation et les évaluations croisées sont donc à développer autant que possible. La construction de l'e-portfolio consolide aussi fermement ces deux capacités fondamentales pour une formation solide.

L'apprentissage étant centré sur l'étudiant, la qualité de l'enseignement se mesure donc à la valeur ajoutée globale en acquis d'apprentissage des étudiants. Les valeurs d'inclusivité de l'EUt+ invitent à mesurer la qualité de l'enseignement au regard de la réussite de tous les étudiants. En ce sens, l'accompagnement de l'étudiant sur un parcours différencié doit être réalisé avec un soin particulier, afin de s'assurer de la maîtrise des prérequis qui doivent être précisément donnés pour chaque unité d'enseignement.

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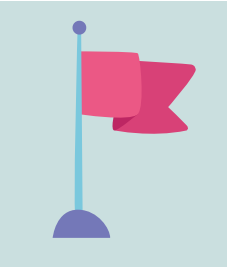
2.6 L'apprentissage expérientiel basé sur les défis / *Challenge-based experiential learning*



L'**apprentissage expérientiel basé sur les défis** consiste à apprendre en immergeant presque constamment les étudiants dans un environnement propice, stimulant et visionnaire pour résoudre des défis du monde réel.

Le passage des méthodes d'enseignement transmissives à une approche socioconstructiviste bouscule le cœur des apprentissages. On passe d'enseignements dont le pivot central est le cours magistral à l'immersion d'étudiants dans un environnement qui attend d'eux une attitude active et collaborative pour la résolution de problèmes qui leur ont été confiés. Il ne s'agit donc plus de quelques projets ici et là, mais d'un « noyau de formation » qui est articulé autour d'au moins un projet majeur permettant une trajectoire d'apprentissage encadrée vers les acquis du diplôme.
Une telle évolution demande un travail de fond qui nécessite du temps : il s'agit d'une transformation générale de l'environnement universitaire, vers des méthodes telles que développées au MediaLab du MIT, par exemple.

Ceci est à lier de près aux nouvelles méthodes pédagogiques : Le « Challenge-based experiential learning » ne doit pas servir de compensation aux enseignements traditionnels, mais à un nouveau socle de structuration de la pédagogie. Ainsi, il est nécessaire d'accompagner les enseignants dans cette démarche.

Chronique

"Les projets sont un élément central des cours de Robyn, et son projet final représentera une part importante de l'évaluation de son diplôme EUt+. Robyn choisit de travailler sur un projet interdisciplinaire intitulé " L'éthique dans la technologie : quel avenir entrevoir ? ". Au cours de ce projet, Robyn interagit avec des étudiants d'autres campus EUt+ et développe diverses aptitudes : esprit de résolution de problèmes, leadership, travail d'équipe, mais aussi créativité. Robyn apprend également à remettre en question son propre rôle dans la société de manière éclairée."
"Dans les séminaires, elle aborde des défis issus de situations réelles dans des centrales électriques de différents pays européens. En collaboration avec les autres étudiants, elle trouve des solutions à ces défis. Leurs enseignants leur fournissent des éclairages issus de leurs projets de recherche actuels. "

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2.7 Pédagogies innovantes / *Innovative pedagogies*

Les **pédagogies innovantes** sont le passage décisif vers des pédagogies socioconstructivistes, centrées sur l'étudiant, où tous les professeurs ont une très bonne maîtrise de la didactique de leur domaine et travaillent en équipe pour mettre en œuvre les méthodes les plus efficaces**.**

L'enseignant, le professeur, n'est plus là pour réciter un savoir disciplinaire et attendre des étudiants qu'ils répondent correctement à des enchaînements de questions. Il n'a plus un rôle de « donneur de cours ».
Il doit concevoir un environnement propice, stimulant et visionnaire où est immergé l'étudiant, et il a un rôle de leader-catalyseur des étudiants dans leur processus d'acquisition de compétences.

L'objectif n'est, en fait, pas l'innovation en tant que telle, il n'est pas l'innovation pour innover. L'objectif est surtout d'utiliser les pratiques les plus performantes pour les étudiants qu'on a et les objectifs qu'on se donne, portées avant tout par une très bonne connaissance de la didactique par les enseignants.
Les pédagogies innovantes n'ont rien à voir avec la digitalisation à outrance des enseignements ou l'introduction du numérique ou de formats originaux d'enseignements « à la mode » ou inspirés, sans réflexion préalable suffisante, d'institutions à forte activité médiatiques.

Il s'agit de quitter la doctrine transmissive de la formation, instituant une transmission du savoir reposant sur un échange fortement asymétrique. L'apprentissage centré sur l'étudiant, valorisant l'acquis d'apprentissage, sa rémanence, sa mobilisation à bon escient est l'objectif à atteindre. Il se substitue à l'évaluation de la capacité de restitution du contenu à peine contextualisé de cours magistraux ou de travaux dirigés par l'étudiant.
Ces pédagogies placent l'étudiant au centre du dispositif d'apprentissage et sa capacité de mobilisation de l'acquis comme preuve de qualité. C'est une évolution profonde de la représentation hiérarchique associée aux modalités pédagogiques « traditionnelles ». Notons que les outils numériques restent assez neutres sur ces évolutions, car le média n'induit pas en soi de modification de la relation pédagogique, si ce n'est qu'il obère largement la communication entre étudiants autour d'un problème donné.
L'encadrement des « Challenge-based experiential learning » demande une telle évolution pédagogique.

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Chronique

"Bien qu'en reprise d'études, il y a d'autres élèves dans sa classe qui ont le même âge et le même profil professionnel, il ne se sent donc pas isolé ou seul. La classe est organisée autour du travail en groupe, il a donc l'occasion de faire connaissance avec les autres. Ces étudiants plus âgés aident également les plus jeunes en leur donnant confiance pour s'exprimer et poser des questions en classe."
"Les étudiants tiennent un e-portfolio de leurs travaux qui leur permet de réfléchir à leur apprentissage et de montrer comment ils pensent atteindre les acquis d'apprentissage terminaux du diplôme. Cela fait partie de l'évaluation finale."

2.8 Rigueur académique / *Academic rigour*

La **rigueur académique** désigne le fait que les professeurs disposent de connaissances complètes et étendues et d'une réflexion profonde et critique pour enseigner et attendre de leurs étudiants un niveau d'exigence élevé.

C'est à l'enseignant que s'adresse ce point, afin d'assurer que le contenu transmis soit déjà au niveau, avec une connaissance qui ne soit pas ponctuelle ni superficielle.

On ne peut exiger de l'étudiant que ce qu'on lui a fait acquérir comme matière, mais aussi comme modèle de comportement. La rigueur académique s'impose à l'enseignant, à la fois sur la maîtrise de ce qu'il enseigne, sur les outils didactiques associés, mais aussi sur l'état d'esprit qu'il communique à l'étudiant.

L'enseignement d'acquis d'apprentissage sous une forme active laisse à l'étudiant une grande autonomie dans la progression. L'enseignant n'est pas la source d'un savoir transmis, mais guide l'étudiant sur un chemin d'apprentissage qui n'est pas linéaire, et qui doit en permanence être adapté à ce qui suscite l'intérêt des étudiants, aux évolutions techniques, aux nouveaux métiers, aux sujets d'actualités, aux interactions avec les autres enseignements ou encore aux prérequis ou aux cultures variables. Il est donc nécessaire que l'enseignant ait une connaissance extensive et profonde de son domaine. Il ne peut simplement professer un cours préparé à l'avance ou corriger des travaux dirigés selon la seule méthode qu'il connaît. La rigueur académique demande une connaissance large et solide qui donne l'aisance nécessaire pour n'avoir aucune difficulté à accompagner avec pertinence et recul des étudiants dans des directions imprévues.

L'enseignement ne peut se satisfaire uniquement d'une maîtrise de sa discipline, aussi profonde soit-elle. Le cerveau de l'étudiant arrivant dans un nouvel enseignement n'est pas vierge, même s'il n'a jamais abordé la moindre question de ce qu'il va y apprendre. Il a ou

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aura spontanément des (modes de) représentations qui perturberont sa capacité à construire un savoir ou des méthodes plus justes. L'enseignement consiste ainsi à accompagner l'étudiant dans des cycles successifs de déconstruction de représentations erronées pour permettre la construction de représentations correctes. Il s'agit d'un processus itératif, long où des représentations différentes se côtoient généralement. L'identification des représentations erronées, des obstacles épistémologiques, la capacité à orienter les étudiants vers les exemples pertinents pour déconstruire et reconstruire des représentations ou les mettre à l'épreuve demande à l'enseignant une maîtrise solide de la didactique de sa discipline. La didactique d'une discipline ne se devine pas, même quand on a une maîtrise profonde et solide de sa propre discipline. Elle demande aussi à être apprise et mise à l'épreuve. Il en va de la rigueur académique : les savoirs ou les méthodes les plus éprouvés ne peuvent être profondément et durablement acquis par un étudiant que s'ils sont enseignés avec une grande dextérité didactique.

Enfin, l'enseignant reste un modèle humain qui influencera profondément l'étudiant par sa rigueur, son sérieux, son courage, sa culture, par la profondeur qu'il montre dans ses réflexions et d'une manière générale dans les valeurs qu'il transmet volontairement ou non. Les valeurs et le comportement du corps enseignant auront une influence profonde sur les étudiants. On ne peut ainsi les distinguer complètement de la « rigueur plus académique », en particulier pour des professions telles que celles de l'ingénieur où la réflexion sur la mise en œuvre du savoir compte autant que le savoir proprement dit.

Enfin, il est important de s'écarter des modes d'enseignement traditionnels transmissifs où l'évaluation « sur table » de l'étudiant fait appel à de nombreux implicites (ce qu'il faut retenir du cours ou des TD, ce qu'il faut dire et comment il faut le dire, etc.) qui sont essentiels pour réussir. Dans ce cas, on procède à une sélection d'étudiants ayant compris les implicites du cadre d'enseignement et d'évaluation en particulier, ce qui est une forme de behaviorisme. Les étudiants bien sélectionnés savent comment se comporter pour continuer à réussir, ce qui garantit des trajectoires de réussites plutôt confortables pour l'enseignant et l'institution. Cependant, elles ne garantissent pas totalement une acquisition en profondeur des enseignements, mais une capacité de restitution selon des codes donnés. La qualité de la formation s'en trouve aussi amoindrie sur le « métier à transmettre ». Ces méthodes transmissives avec des évaluations standardisées ne reposant pas sur des acquis d'apprentissage contextualisés mènent ainsi à des apprentissages de qualités hétérogènes et non garanties, ce qui va à l'encontre de la rigueur académique attendue.

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Extrait de notre dossier de candidature :

Objectives of the proposal	***Indicators:*** *List relevant quantitative and qualitative indicators showing whether and to what extent the objectives of the alliance are being achieved. Please indicate your target where possible.*	***Source of information:*** *How could these indicators be measured? - What could be the sources of information?*	***Assumption and risks:*** *What might be the factors and conditions not under the direct control of the alliance which are necessary to achieve these objectives? What risks have to be considered?*
Academic freedom and integrity	Satisfaction of academic and student teams	Return of external solicitations and audits	External factors explicitly or implicitly limiting freedom of expression and ethical conduct

2.9 Interdisciplinarité / *Interdisciplinarity*

Les étudiants sont conscients que les problèmes réels sont profondément complexes et nécessitent une synergie de disciplines très différentes pour être appréhendés, et que les compétences pour y faire face sont nécessairement **interdisciplinaires**.

Là, toujours un gros écueil : pour certains, l'interdisciplinarité, c'est mélanger la mécanique et la thermodynamique !

Les compétences du diplôme sont structurellement interdisciplinaires, elles sont même transdisciplinaires : la marche spontanée du monde n'a que peu à faire de nos découpages disciplinaires. L'étudiant doit être en mesure :

- D'associer des éléments disciplinaires différents afin de résoudre un problème qui lie des questions relevant de disciplines diverses ;
- De traiter un problème dont aucune partie n'est réductible à des éléments disciplinaires, où chaque élément est ainsi complexe par essence.

Il n'est pas envisageable de demander à l'étudiant de faire cet exercice en toute fin de cursus, car cet apprentissage du décloisonnement est long. De plus, l'étudiant ne peut être seul à l'effectuer, prenant à sa charge le décloisonnement qui n'est pas effectué par les enseignants. L'interdisciplinarité ne peut être uniquement abordée lors de projets, de stages ou d'activités interdisciplinaires. C'est l'ensemble des enseignements, sans exception, qui est concerné.
Il faut entendre que le niveau d'interdisciplinarité est induit par les problèmes réels qu'auront à résoudre nos diplômés au cours de leur carrière professionnelle et de leur vie citoyenne. Les diplômés du supérieur auront à aborder des problèmes dans lesquels les questions de sciences « dures » seront indissociables de questions techniques, de problématiques de sciences humaines et sociales ainsi que de questions éthiques, environnementales ou financières. C'est nécessairement ce degré d'interdisciplinarité qui devra être progressivement atteint au cours du cursus. Ainsi, les enseignements mêmes doivent aborder

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en leur sein la complexité interdisciplinaire, à un niveau graduel et adapté à la progression de l'étudiant.

Dès le tout début de la formation, le cloisonnement traditionnel des enseignements doit disparaître entre les matières traditionnellement connexes et offrir autant de ponts que possible. Progressivement, les disciplines ne seront plus simplement connectées et décloisonnées, mais traiteront utilement de problèmes adaptés pédagogiquement pour amener les étudiants dans la profondeur d'une réflexion qui combine solidité des acquis disciplinaires et complexité des problèmes réels.

Chronique

"Après de longues conversations sur la possibilité de moduler les cours de manière flexible, Robyn est convaincue que l'interdisciplinarité est un 'must' : les défis sociétaux d'aujourd'hui exigent la complémentarité de différentes disciplines, car toute compétence mélange la plupart d'entre elles. Elle choisit ses cours technologiques classiques, en mélangeant l'ingénierie technologique avec des cours d'éthique appliquée et de sciences de la soutenabilité. L'objectif, pense-t-elle, est de réunir différents modules reliés thématiquement, en lien avec son projet professionnel. Par l'interdisciplinarité de ses cours, Robyn apprendra à réfléchir d'abord à l'Humain et à être consciente de son environnement, pour devenir une citoyenne technologiquement responsable et consciente."

2.10 Sensibilisation et participation à la recherche / *Exposure and engagement with research*

La **sensibilisation et la participation à la recherche** consistent à sensibiliser les étudiants aux méthodes et aux résultats de la recherche de différentes manières, en fonction de leur niveau et de leurs ambitions.

L'étudiant doit être conscient de l'existence de la recherche, de son rôle, de ce qu'elle permet, mais aussi ce qu'elle ne permet pas, de sa diversité, et, selon son niveau, initié aux méthodologies. Il doit aussi clairement distinguer la recherche de l'innovation.
Ceci peut se faire de différentes manières, selon le domaine, le niveau ou les aspirations de l'étudiant. On a cependant conscience qu'une simple visite d'un laboratoire de recherche ou un projet de quelques heures n'apporte pas grand-chose sur ce point. Un travail d'échange sur le rôle de la recherche et de ses méthodes est nécessaire.

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EUt+ Bachelor

Au cours du Bachelor, une découverte de la recherche et une présentation de son rôle sont données à tous les étudiants. Cette découverte prend diverses formes au cours du cursus, car les étudiants ne sont pas tous également réceptifs au même niveau.
Les plus motivés peuvent, d'une manière ou d'une autre, participer à une activité de recherche pour découvrir cet approfondissement.

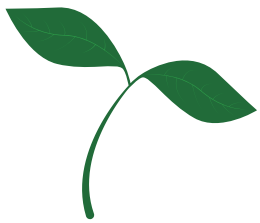
EUt+ Master

Une période substantielle sera passée sur une question issue de la R&D, en secteur public ou privé, selon une approche adaptée. Il est attendu de cette expérience une initiation aux méthodes de la recherche, et une prise de conscience de son positionnement.
Dans le cas des graduate schools, l'exposition à la recherche est permanente, car il s'agit du lieu essentiel d'accueil de l'étudiant.

Qualité et process qualité

En Master en ingénierie, l'exposition à la recherche fait utilement l'objet d'un acquis d'apprentissage ou d'éléments d'acquis d'apprentissage bien identifiés.

2.11 Engagement civique / *Civic engagement*



L'**engagement civique** écarte le principe des élites confinées dans une "tour d'ivoire" et soutient qu'il n'y a pas de science pertinente sans conscience.

Cela concerne autant le public que les grands enjeux sociétaux et fondamentaux, en demandant une sécularisation très forte des enseignements.

L'étudiant diplômé doit avoir conscience de son rôle sur le monde. Il est formé pour prendre conscience de son rôle et son devoir sur l'extérieur, et non pas uniquement tirer égoïstement profit des opportunités. Les diplômés doivent être responsables, avec une conscience citoyenne et un fort esprit critique.

L'engagement civique n'est pas une microactivité philanthropique où une (future) élite rencontre dans un cadre limité le reste de la population. Il s'agit de la prise de conscience du rôle des diplômés dans l'ensemble de la société et, en particulier, l'interdépendance de tous

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ses acteurs. L'impact des activités humaines et notamment des technologies sur l'environnement est une composante majeure de cet engagement civique.

L'apprentissage de la responsabilité sociétale et environnementale dont les diplômés seront des acteurs importants est fait à travers cet engagement civique. Les questions éthiques sont aussi abordées. Les conséquences de la technique sur la société et l'environnement sont souvent indirectes : lors de leur engagement civique, les diplômés découvrent cette complexité qui doit les amener à une réflexion fine sur les enjeux des outils qu'ils sont amenés à développer.

L'engagement civique permet des acquis d'apprentissage qui seraient difficilement obtenus autrement. Il permet aussi une approche de l'interdisciplinarité des problématiques réelles.
L'engagement civique ne doit pas pallier un académisme trop fort dans les enseignements : sa prise de conscience doit être intégrée dans l'ensemble des unités d'enseignement, aux côtés d'activités en prise avec l'extérieur. Les enseignements « traditionnels » doivent ouvrir à ces problématiques pour que les étudiants tirent le plus grand bénéfice de ces périodes d'engagement.

Chronique

"Pendant son séjour, en raison de son engagement civique, Robyn s'implique dans sa communauté locale. Il apprend à interagir avec les autres en dehors du campus et à s'adapter à des situations nouvelles. Le fait de nouer des relations avec ses camarades de classe des autres campus de l'EUt lui fait prendre conscience de son identité européenne, de l'importance du fait que nous vivons dans une société où les gens sont si divers, et ces interactions le préparent au monde de demain."

EUt+ Bachelor

En Bachelor, l'engagement doit permettre, au travers de diverses activités, une prise de conscience de l'interdépendance des composantes de la société et de son environnement.

EUt+ Master

En Master, préparant un rôle de cadre, le diplômé doit être prêt à une réflexion approfondie et une attitude proactive sur son rôle dans la société et sur l'environnement. Notamment, il intègre les notions de développement durable et de responsabilité sociétale à l'ensemble de ses activités avec la proportion requise.

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Qualité et process qualité

L'engagement civique fait l'objet d'acquis d'apprentissages, validé sur la démonstration de ces acquis et pas uniquement sur le temps consacré à une telle activité. Les compétences reflètent cette dimension.

2.12 Adaptation aux besoins du futur marché du travail / *Alignment with future labour market needs*

L'**adaptation aux besoins futurs du marché du travail** permet aux étudiants d'être très flexibles et d'anticiper sur un marché du travail et des attentes en matière de compétences qui vont changer radicalement au cours des prochaines décennies.

La question qui se pose ici est de permettre aux étudiants de suivre des évolutions drastiques et imprévisibles des compétences nécessaires, car il ne sera pas possible de former en masse des dizaines de millions d'adultes quand les métiers vont évoluer fortement, sans qu'on sache dès maintenant prévoir quoi que ce soit à ce propos.

Dans les formations technologiques, l'alignement avec le marché du travail passé et actuel est généralement très bon. Il est plus difficile quand il s'agit d'anticiper les évolutions générales. L'alignement sur le futur marché du travail nécessite :

- Un travail prospectif de fond sur les tendances et évolutions, qui ne se nourrit pas exclusivement des tendances en recherche ;
- La formation d'étudiants avec un très bon degré de polyvalence, notamment reposant sur des bases scientifiques et techniques solides ;
- L'introduction importante de sciences humaines et sociales dans les formations technologiques, notamment pour disposer des outils et de la capacité de réflexion pour anticiper et suivre un monde qui change ;
- Le développement de fortes capacités d'auto-apprentissage ;
- Un goût (ou au moins l'absence de réticence) pour la mobilité disciplinaire et géographique.

Cet alignement n'est pas que le fait des directions de curricula ou des choix de programme. Il est intégré à tous les niveaux de granularité, notamment au sein des enseignements. L'alignement sur le futur marché du travail repose donc notamment sur l'exposition, d'une manière ou d'une autre, de l'ensemble du corps pédagogique aux activités économiques et aux secteurs amenés à employer les étudiants.
Il nécessite aussi un continuum dans les enseignements en évitant de trop distinguer l'académique de l'applicatif.

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3 Annexe : Compétences générales des Masters Ingénieurs de l'Université de technologie européenne

Memorandum of Understanding

Competency framework of the European University of technology Masters of engineering

The eight partners constituting the European University of Technology agree on the following general competency framework for their Masters of Engineering graduates:

Identifying, analysing comprehensively and formalising complex or multidisciplinary technical or socio-technical problems by relying on solid scientific and technical skills and knowledge.
Proposing and designing original, resilient, sustainable and reliable solutions or systems, integrating all technical, societal, human, environmental and economic constraints over the entire life cycle.
Managing a team or structure in an international, transdisciplinary and multilingual context, integrating social and legal aspects, interacting, integrating a wide variety of profiles, ensuring the integrity of the work and the expression of diversity.
Piloting a process or system reliably and efficiently; deciding, planning and organizing with a holistic vision; anticipating and preventing direct or indirect local impacts of a system on its territory, while being aware of the global challenges.
Guaranteeing a quality or validation process at all levels; carrying out a continuous improvement process; evaluating performance and margins for improvement and progress.
Exchanging, receiving and transmitting information and ideas to any trade at any level of qualification and to the civil society; assessing information; accompanying professional developments; assessing and completing training and self-training needs; self-directed learning.
Leading or supporting an innovation process and implementing original proposals, based on the state of the art and mobilising a variety of skills, proposing solutions based on an avant-garde vision; contributing to a research and development process, evolving in an uncertain and restricted technical and technological environment.

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Protocole d'accord

Compétences générales des Masters Ingénieurs de l'Université de technologie européenne

Les huit partenaires constituant l'Université de technologie européenne s'accordent sur les compétences générales suivantes pour leurs diplômés de *Master Ingénieur* :

Identifier, analyser avec une vision globale et formaliser des problèmes techniques ou sociotechniques complexes ou pluridisciplinaires en s'appuyant sur des aptitudes et une culture scientifique et technique solides.
Proposer et concevoir des solutions ou des systèmes originaux, résilients, pérennes et fiables, en intégrant l'ensemble des contraintes techniques, sociétales, humaines, environnementales et économiques sur l'ensemble du cycle de vie.
Gérer une équipe ou une structure dans un contexte international, transdisciplinaire, et polyglotte, en intégrant les aspects sociaux et juridiques, interagir, intégrer une grande variété de profils, garantir l'intégrité du travail et l'expression de la diversité.
Piloter un procédé ou un système avec fiabilité et efficience ; décider, planifier et organiser avec une vision systémique ; anticiper et prévenir l'ensemble des incidences locales directes ou indirectes d'un système sur son territoire, tout en ayant conscience des enjeux globaux.
Garantir un processus de qualité ou de validation à tout niveau, mener une démarche d'amélioration continue, évaluer les performances et marges d'amélioration et de progression.
Échanger, recevoir et transmettre des informations et des idées à tout corps de métier et tout niveau de qualification ainsi qu'à la société civile ; vérifier des informations ; accompagner les développements professionnels ; évaluer et compléter les besoins de formation et d'autoformation ; s'autoformer.
Mener ou accompagner une démarche d'innovation et concrétiser des propositions originales, s'appuyant sur l'état de l'art et mobilisant des compétences variées, proposer des solutions s'appuyant sur une vision d'avant-garde ; contribuer à un processus de recherche et développement, évoluer dans un environnement technique et technologique incertain et contraint.

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