

Course catalogue and Expected Learning Outcomes

the experience of Politecnico di Torino



**POLITECNICO
DI TORINO**

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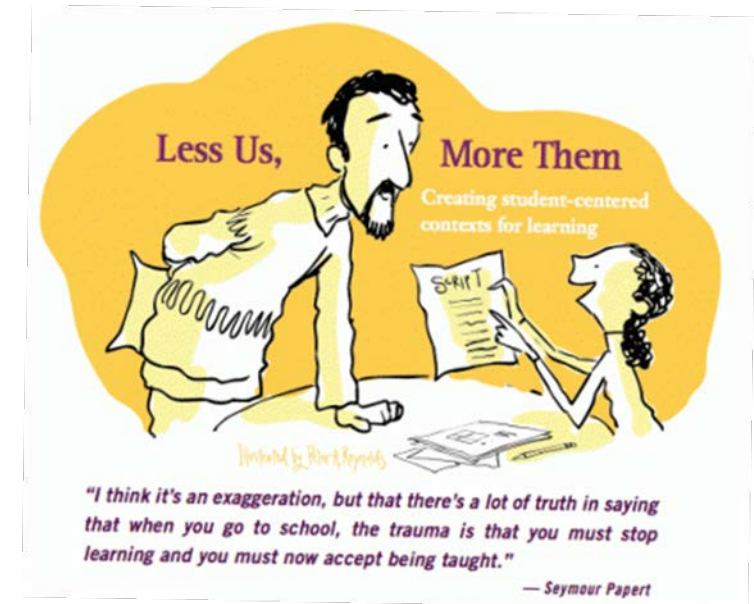
The Bologna Process, a lesson of comparability

The purpose of the Bologna process is the harmonization of European higher education systems through the adoption of a system of “comparable” degree programmes, which means degree programmes that have comparable “learning outcomes”.

The objective of comparability of learning outcomes has promoted (or, rather, it should have promoted) the need for a new approach in the design of the degree programmes, as a consequence of the Bologna declaration.

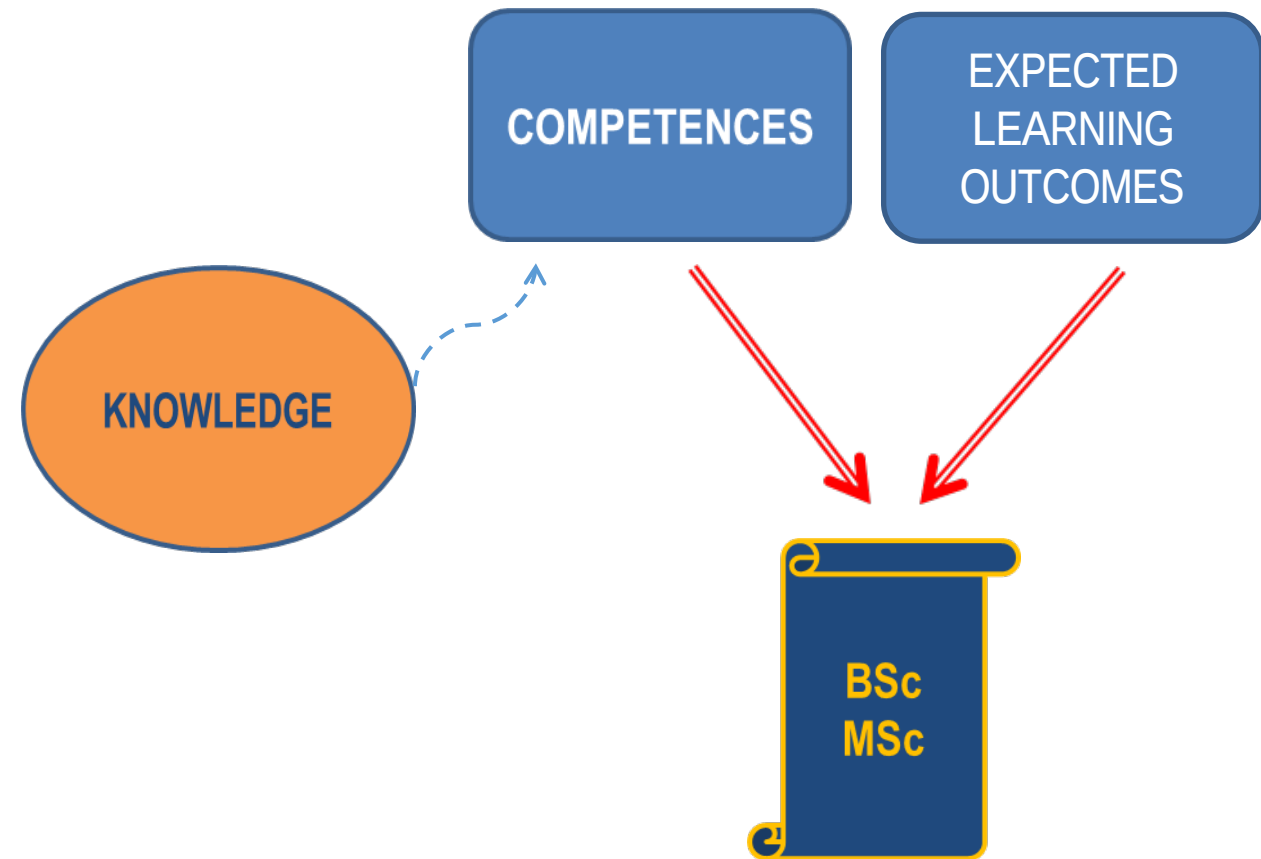
Moving from a teacher-centered class to a student centered approach...

The purpose of a “student-centered” degree program is to provide students with the **necessary skills** for them to be able to compete in a globalised world and to be able to enter the labour market covering specific **roles and functions**. In these degree programs the focus, therefore, is no longer on what the student must be taught, but on learning, that is, what the student must know (*knowledge*) and know how to do (*skills*).



...which implies a shift from knowledge to competences and expected learning outcomes

Consequently, the degrees that lead to a BSc or a MSc must no longer be described and planned only on the basis of the contents, but mainly based on the **competences**, which must be developed and acquired by the graduates, and on the **learning outcomes** that the students are expected to achieve at the end of the degree program



Competences ≠ Expected Learning Outcomes

The document *Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for Lifelong Learning (EQF for LLL)* provides the following definition for competence:

“Competence means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development”.

Competences ≠ Expected Learning Outcomes

In particular, the learning outcomes are nothing more than *knowledge and skills* and competences could be defined as the *ability to use the learning outcomes* acquired during the degree program to achieve certain results, both in work or study situations.

Another difference is that while competences are defined in rather general terms, often *specific but not measurable*, learning outcomes are defined in terms that are also (and above all) *measurable*.



Formulation of the Expected Learning Outcomes

Good learning outcomes are focused on what the learner will know or be able to do by the end of a defined period of time and indicate how that knowledge or skill will be demonstrated.

A widely accepted way of formulating LOs is based on three essential elements:

1. Use an **active verb** to express what students are expected to know and be able to do (e.g. *describe, implement, draw conclusions, assess, plan,...*)
2. Specify **what this outcome refers to** (*object or skill*).
3. Specify **the way of demonstrating the achievement of LOs**.

From ECTS USERS' GUIDE

(https://europass.cedefop.europa.eu/sites/default/files/ects-users-guide_en.pdf)

Designing a student-centered study program, within Italian HE regulation system

Italian Higher Education regulation system foresees that study programs are grouped in degree classes, defined by two different Ministerial Decrees (one for BSc and one for MSc).

http://attiministeriali.miur.it/media/155598/dmcdl_magistrale.pdf

Each class is identified by a code (e.g. L-8 or LM-32) and brings together study programs characterized by the same educational objectives (knowledge and skills that characterize the cultural and professional profile), which have been defined by law.

Moreover the educational objectives consist in a list of ECTS distributed in Scientific-Disciplinary Subjects (SSD) defined at national level by the class tables, while the universities are quite free in determining the distribution of the credits.

Designing a student-centered study program, within Italian HE regulation system

LM-32 Classe delle lauree magistrali in INGEGNERIA INFORMATICA

OBIETTIVI FORMATIVI QUALIFICANTI

I laureati nei corsi di laurea magistrale della classe devono:

- conoscere approfonditamente gli aspetti teorico-scientifici della matematica e delle altre scienze di base ed essere capaci di utilizzare tale conoscenza per interpretare e descrivere i problemi dell'ingegneria complessi o che richiedono un approccio interdisciplinare;
- conoscere approfonditamente gli aspetti teorico-scientifici dell'ingegneria, sia in generale sia in modo approfondito relativamente a quelli dell'ingegneria informatica, nella quale sono capaci di identificare, formulare e risolvere anche in modo innovativo problemi complessi o che richiedono un approccio interdisciplinare;
- essere capaci di ideare, pianificare, progettare e gestire sistemi, processi e servizi complessi e/o innovativi;
- essere capaci di progettare e gestire esperimenti di elevata complessità;
- essere dotati di conoscenze di contesto e di capacità trasversali;
- avere conoscenze nel campo dell'organizzazione aziendale (cultura d'impresa) e dell'etica professionale;
- essere in grado di utilizzare fluentemente, in forma scritta e orale, almeno una lingua dell'Unione Europea oltre l'italiano, con riferimento anche ai lessici disciplinari.

L'ammissione ai corsi di laurea magistrale della classe richiede il possesso di requisiti curriculari che prevedano, comunque, un'adeguata padronanza di metodi e contenuti scientifici generali nelle discipline scientifiche di base e nelle discipline dell'ingegneria, propedeutiche a quelle caratterizzanti previste nell'ordinamento della presente classe di laurea magistrale.

I corsi di laurea magistrale della classe devono inoltre culminare in una importante attività di progettazione, che si concluda con un elaborato che dimostri la padronanza degli argomenti, la capacità di operare in modo autonomo e un buon livello di capacità di comunicazione.

I principali sbocchi occupazionali previsti dai corsi di laurea magistrale della classe sono quelli dell'innovazione e dello sviluppo della produzione, della progettazione avanzata, della pianificazione e della programmazione, della gestione di sistemi complessi, sia nella libera professione sia nelle imprese manifatturiere o di servizi che nelle amministrazioni pubbliche. I laureati magistrali potranno trovare occupazione presso industrie informatiche operanti negli ambiti della produzione hardware e software; industrie per l'automazione e la robotica; imprese operanti nell'area dei sistemi informativi e delle reti di calcolatori; imprese di servizi; servizi informatici della pubblica amministrazione.

Gli atenei organizzano, in accordo con enti pubblici e privati, stages e tirocini.

ATTIVITÀ FORMATIVE INDISPENSABILI

Attività formative:	Ambiti disciplinari	Settori scientifico-disciplinari	CFU	Tot. CFU
Caratterizzanti	Ingegneria informatica	ING-INF/04 - Automatica ING-INF/05 - Sistemi di elaborazione delle informazioni		45

TOTALE

45

The study programs created in the same class have the same legal value. This means that the qualification is a real public certificate that has value throughout the national territory for admission to State certification exam or for participation in public competitions.

Designing a student-centered study program, within Italian QA framework

Further to the provisions of the degree classes, each study program has to draw up annually a document called SUA-CdS, which is requested within the national process of Quality Assurance of Teaching and Learning.

This is a functional document for designing, implementation, management, self-assessment and planning of the study programme.

https://didattica.polito.it/pls/portal30/sviluppo.vis_aig_2013.visualizza?p_a_acc=2020&sducuds=0&pag=sua

It gathers the information needed to make public the outgoing profiles, specific educational objectives, education path, expected learning outcomes, roles and responsibilities for the management of the degree program, the conditions for the periodic review as well as any corrections and possible improvements.

Therefore, a proper process of designing a student-centered degree program should foresee the following 5 steps.

1. Identification of the training needs required by stakeholders

The **training needs** necessary for the interested parties (students and stakeholders from industries, labour market,...) should be identified in a way that is useful for defining the aims of the study programs and, therefore, in terms of the functions envisaged for graduates and the skills required for their development.

SUA-CdS, section A1 - Consultation with interested parties

https://didattica.polito.it/pls/portal30/sviluppo.vis_aig_2013.visualizza?sducds=37320&p_a_acc=2020&tab=sA1a

2. Definition of the aims of the study programs

The SUA-CdS identifies the **professional profile(s)** that the study program intends to form. This implies that the cultural/professional profiles have to be described through:

- *functions* which graduates are trained for (it can also include the continuation of studies in MSc or PhD courses for graduate students)
- *skills* that graduates should develop and acquire, necessary to implement the planned functions, consistent with the aims of the study program, with the qualifying educational objectives of the degree class.

SUA-CdS, section A2 - Professional profiles and Career Options

https://didattica.polito.it/pls/portal30/sviluppo.vis_aig_2013.visualizza?sducids=37320&p_a_acc=2020&tab=A2a

https://didattica.polito.it/pls/portal30/sviluppo.vis_aig_2013.visualizza?sducids=37320&p_a_acc=2020&tab=A2b

3. Definition of specific educational objectives (Italian feature)

The **specific educational objectives** are meant to detail the qualifying educational objectives for each study program (the specific educational objectives *"detail and clarify the objectives foreseen for the degree class"*).

Therefore, the specific educational objectives must be consistent:

- with the qualifying educational objectives of the class, which are very general and broad, and also
- with the defined competences.

SUA-CdS, section A4 - Specific educational objectives and description of educational path

https://didattica.polito.it/pls/portal30/sviluppo.vis_aig_2013.visualizza?sducids=37320&p_a_acc=2020&tab=A4a

4. Definition of expected learning outcomes

The definition of the **expected learning outcomes** have to be consistent:

- with the specific educational objectives of the study program and, in particular,
- with the competences that the graduates are expected to develop and acquire by the end of the study program.

SUA-CdS, section A4 - Definition of expected learning outcomes

https://didattica.polito.it/pls/portal30/sviluppo.vis_aig_2013.visualizza?sducds=37320&p_a_acc=2020&tab=sA4b1

https://didattica.polito.it/portal/pls/portal/sviluppo.vis_aig_2013.visualizza?sducds=37320&p_a_acc=2020&tab=sA4b2

https://didattica.polito.it/pls/portal30/sviluppo.vis_aig_2013.visualizza?sducds=37320&p_a_acc=2020&tab=A4c

5. Definition of the course programme

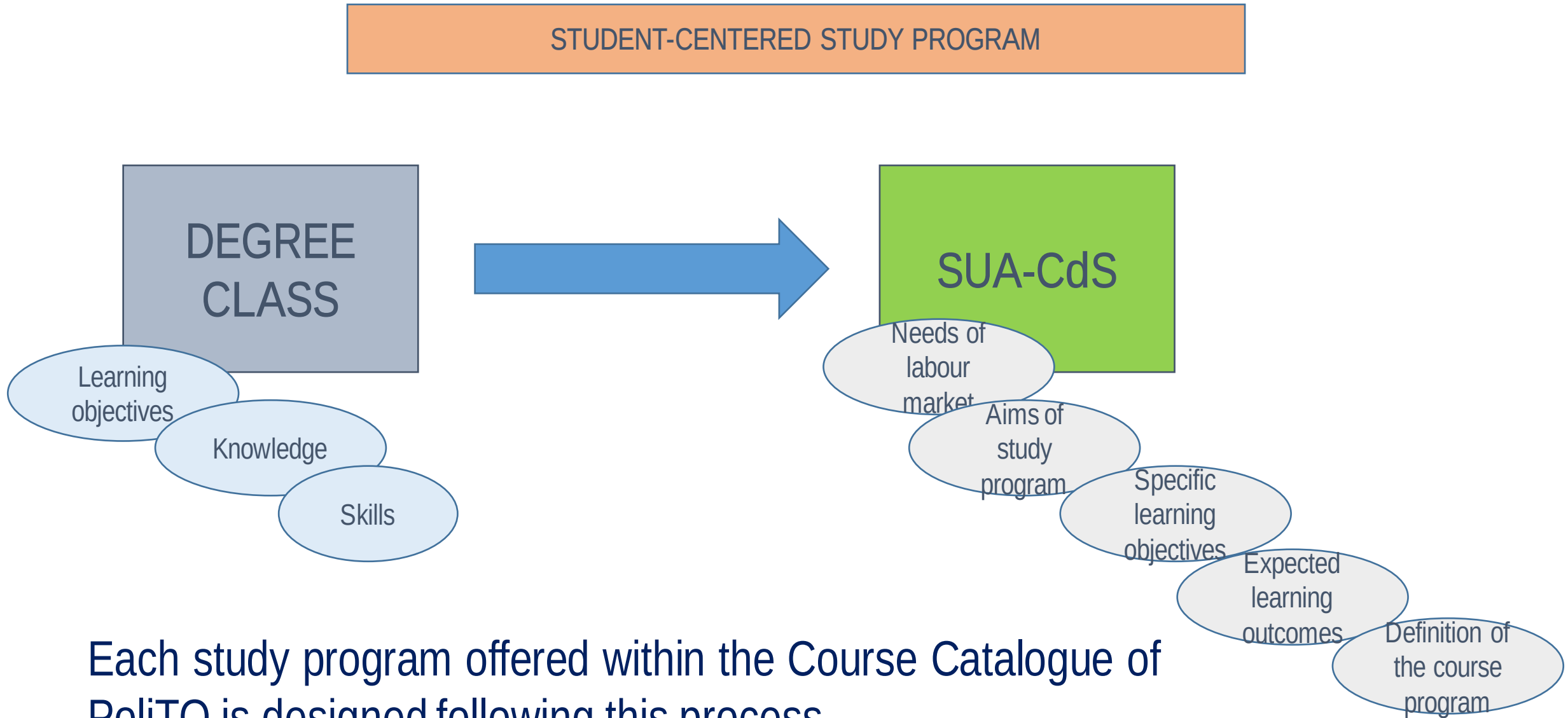
The definition of the **course programme** consists in the list of courses and other educational activities.

Each course has its specific syllabus which summarizes in detail:

- description of the course
- expected learning outcomes of the course
- course topics
- course structure
- reading materials
- assessment and grading criteria

https://didattica.polito.it/laurea_magistrale/data_science/en/home

To sum up



Benefits and disadvantages of this design process

- the design process "suggested" by the SUA-CdS is entirely consistent with the "student-centered" design process suggested internationally;
- it encourages each study program to interact with labour market stakeholders in order to align the curricula to the current industrial needs;
- it requires consistency between specific educational objectives and expected learning outcomes;
- it is also a tool for self-assessment, as it provides each degree program with the possibility to adjust its course program and improve it every year;
- it makes a study program comparable to another (this does not mean they are equivalent);
- this process is perceived as time-consuming and (sometimes) is seen as just a bureaucratic accomplishment.

Contacts

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