# Intended Learning Outcomes for Professional and Personal Development

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This document is a part of the development of the P&PD learning line that is an element of Bachelor College (BC) 2.0. It builds upon the earlier work of the P&PD working group and the competencies established together with the curriculum committee of BC 2.0. The document contains a catalogue of ILO’s relating to the Professional and Personal Development Learning Line. At the risk of saying things that are already well known, a few reminders:

1. An ILO forms the objective of a course and must be aligned with, and explicitly reflected in, the learning activities and assessment methods and rubrics
2. ILOs should preferably be both formatively and summatively assessed. If the ILO is only formatively or only summatively assessed this should be made explicit in the study guide.
3. ILOs should be formulated in demonstrable behavior. Tacitly by doing and explicitly by drawing, talking, writing, or calculating. The students should be invited to show they have mastered the knowledge by defining, describing, enumerating, arguing, motivating, applying correctly, taking the correct steps, discussing the pros and cons, etc.
4. A general rule for ILO’s is that there are various sorts of concepts that students need to be able to work with: elements and things, methods procedures and protocols and attitudes, ideals, goals, and objectives.
   1. For elements and things ILO’s can be formulated in terms of defining and describing elements of {the discipline or subject}, enumerating specific properties and describing how these properties can be used to argue their application in a certain situation and what the consequences and implications would be of such an application.
   2. For methods, procedures, and protocols ILO’s can be formulated similarly in terms of defining and describing method(s)/techniques, describing what the method is used for, what its purpose is, enumerating and describing the steps a researcher needs to take to achieve a valid result and describing the characteristics of a valid result (what counts as a valid result) and the criteria upon which this depends.
   3. For attitudes, ideals, objectives, and goals we can formulate ILO’s in terms of defining and describing the goals of —for example— sustainable design/the energy transition, sustainable use of materials and building production/ inclusivity, enumerating and describe the main characteristics whereby you can identify a (non) sustainable process/product, or: define and describe what an academic attitude/professional attitude is and how to recognize such an attitude in the behavior of people.

## Levels of Competence Development

1. A student can demonstrate through description, definition and enumeration an understanding of what the competence entails and is aware of why it is important for the domain of practice by describing and enumerating the reasons for the value placed upon that competence.

1. The student can perform and explain competence-related activities under supervision, and effectively communicate how the competence is developed. The ability to explain something means in demonstrable behaviour that a student is able to give valid arguments for adopting an attitude or performing an action and argue for and against certain practices.

1. The student can apply and develop a competence effectively and independently to produce the desired outcomes as well as critically evaluate their own performance. With this is meant that the student can explore possibilities latent in a situation relevant to that competence and critically evaluate the outcomes of those explorations against criteria that are made explicit.

1. Manages personal competence application and development and that of others to produce the desired outcomes. With management is meant the ability to listen to various arguments and then create enough of a support base to implement the best approach.

To avoid endless repetition all the following points assume the following phrase as their point of departure “At the end of this course the student is able to….”

## Glossary

The ability to say “I know this or that” rests upon the question whether you can say that you understand this or that. As such the most important word in education is the word understanding.

To understand something means for the student to be able to:

1. describe what claim is made and what evidence there is for making such a claim
2. list and to describe what other claims must already be in place for the student to make that claim
3. describe what else the student is committing herself to when making that claim. The student must be able to list and describe the implications of a claim made and use them as reasons for her commitment to that claim
4. to list describe what other ideas are compatible or incompatible with the claim made
5. describe what the student is entitled to say and do in committing herself to that claim
6. describe what activities become necessary once one has committed to a claim.
7. describe what outcomes may be expected on the basis of that claim? What guarantees can you give on the basis of that idea?

To achieve understanding the student is required to perform a number of activities. In this glossary familiar words are defined in terms of a demonstrable activity.

**analysing**: the activity of differentiating a whole into its constituent parts and describing the working relationship of those parts in relation to each other and to the whole.

**arguing**: giving reasons to underpin a certain point of view or adapting a point of view as a result of being given reasons for its weakness or failure.

**being aware**: having (partial) knowledge of the presence of something and its possible implications

**criticizing**: the activity of evaluating something in relation to some purpose or goal

**defining**: the activity of describing what something is in terms of what it does

**denoting:** the activity of naming, predicating, narrating, describing, portraying, labelling, any application of a symbol of any kind to an object, event, or other instance of it.

**describing**: the activity of using words, imagery of numbers to denote, qualify and or quantify something

**enumerating**: see listing

**exemplifying:** the activity of showing a property pertaining to the object. (i.e. *showing the construction*)

**explaining**: the activity of demonstrating understanding (see understanding)

**expressing:** the activity of showing a property that an object does not have but which it acquires through association, i.e. is assigned them through simile, metaphor, and analogy.

**feedback**: information given by something or someone as a result of some action

**knowing**: the activity of possessing an understanding of something

**listing**: the activity of noting down all relevant constituent parts of some issue or subject

**processing**: the activity of working through feedback

**qualifying:** the activity of ascribing or attributing a property to something

**quantifying:** the activity of ascribing a numerical property to something

being **rational**: the activity of giving legitimate reasons to support a pint of view or theory

being **irrational**: the activity of giving weak or illegitimate reasons to support a point of view or theory

**thinking**; the activity of conceptualising information through analysis and critique thus preparing that information for use in relating the thinker and or her thoughts to her environment.

# Academic attitude and dealing with scientific and scholarly information

This aspect includes knowledge and skills related to the key concepts of the discipline and engineering profile that the program is aimed at. It also includes more general academic skills that a graduate need in order to operate within the engineering profession.

1. search for (state of the art and properly scientific) information in the library and on the internet
2. analyze the information and give arguments for its scientific or scholarly cogency either being able to describe its provenance or to argue its claims
3. process the information by documenting sources used meticulously and fully according to a system that is consistently used
4. describe the system whereby sources are to be documented and the principles underpinning that system
5. indicate the extent of or boundaries of her expertise

# Professional Competences

This refers to the general competences required to functioning in a professional setting, like communicating (e.g., presenting, writing), planning and organizing, collaborating (including working in international and multidisciplinary teams with different interests and responsibilities), dealing with scientific information, and reflecting. The ILO’s include the entry requirements for the Y2Q4 interdisciplinary CBL course, which are described in the Bachelor College Directives:

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| --- | --- | --- |
| **Collaborating** | **Communicating** | **Planning & Organizing** |
| The student is able to work with peers towards achieving a common goal within a set period. Accordingly, the student together with the team can come to a division of assigned tasks across the team members. The student can, under supervision, identify how individual competences are used within the team and support the development of competences of team members. The student is able to appropriately give and receive constructive feedback in a group setting.  Note: The student is aware that addressing many complex challenges may require collaboration between multiple  disciplines. | The student can present their work and discuss ideas orally, in writing and visually. The student can adjust their communication towards interacting with specific target audiences.  The student is able to proficiently communicate in English. | The student can, under supervision, translate a common goal into tasks and activities. Accordingly, the student is able to organize their own activities in the context of a team, given constraints (resources, timing, scope). The student is aware of (discipline- specific) tools and methods that support planning. |

## Communication

1. present ideas coherently and clearly underpinned with evidence
2. explain and motivate points of view using compelling evidence as reasons
3. describe results, methods, and processes with the correct terminology used in the correct way
4. justify conclusions to others orally, in writing and/or visually
5. communicate in English in such a way that the interlocutor can fully understand what is being communicated
6. listen actively and demonstrate the ability to do so by giving an accurate precis of what has been discussed when challenged to do so.

## Oral Presentation

1. demonstrate that the presentation is professionally prepared. This becomes visible in the care with which all details are taken account of everything is ready and working well before the start of the presentation, rooms are booked and prepared, the technology is tested and functioning. Media (posters, models, PowerPoint) are all carefully crafted demonstrating knowledge of what effective communication is about.
2. give a clear introduction to the structured presentation describing how and why the presentation is structured the way it is
3. speak clearly using the correct technical jargon in the correct context
4. conclude finished topics and introduce new topics systematically and describing how the one is linked to the other
5. maintain the interest of the audience without frivolous and trivial means but by concentrating on the matter in hand
6. lead the subsequent discussion, demonstrating that the student can listen actively to points made by the committee or the public by answering them sensibly demonstrating her grasp of the topic

## Writing

1. argue a case thoroughly by giving well-grounded reasons/evidence for every decision/claim made
2. organize the report/essay in such a way that all the required elements are in place and so structured that the reader can, with little effort, make sense of each element and place it within the context of the project as a whole
3. describe the structure of the report and demonstrate how it follows a path that is logical from a frame of reference or purpose that is made explicit
4. construct chapters, paragraphs, and sentences so that each follow a narrative logic that can be made explicit
5. describe how each chapter, paragraph, and sentence are related to the previous and following chapters, paragraphs, and sentences
6. describe what the purpose and most effective form for of the various elements of a report are regarding the
   * Title/Subtitle
   * Abstract and Key Words
   * Layman’s Summary
   * Introduction
   * Methodology
   * Results
   * Composing tables and figures
   * Relating text with image
   * Discussion
   * Literature Review
   * Research proposal
7. describe and/or demonstrate the proper composition and structure of a sentence (subject verb predicate/object) and punctuation
8. use the correct technical vocabulary in the correct way
9. use the correct tenses

## Argumentation and demonstrating understanding

1. describe, define, and demonstrate the application of the concept of {\*} in discourse and in the performance of research or design
2. describe a point of view
3. give reasons underpinning a certain point of view
4. analysing a point of view as a whole by differentiating it into its constituent parts and showing how they relate to each other and describe how each part performs its specific role in that whole
5. critique a point of view by showing how it is of value to some end

## Visualising, Drawing & modelling

1. describe the purpose and elements of various kinds of visualisations, drawings or models giving reasons for which technique is best at displaying what kind of information
2. describe and demonstrate what level of technical detail is appropriate to the scale used
3. communicate accurately and honestly about the design
4. use the correct codes for materials and elements in a technical drawing
5. choose, argue, and demonstrate the most effective line thicknesses for the representation of the various elements to be built in a technical drawing
6. choose, argue, and demonstrate the most effective use of color and shading
7. choose, argue, and demonstrate the ability to make effective renders and the most effective viewpoints to show the strengths (and where necessary) weaknesses of the project
8. make models with care and accurately, give reasons for why the models was made the way it is
9. give reasons for how the model gives different information to the drawings.
10. sequence posters and slides according to a clear narrative logic that, if challenged, the student can describe and give reasons for
11. design posters and slides in such a way that they can be considered as effective vehicles of relevant information leaving out non-relevant information. If challenged the student can describe and argue the relevance of all information on the poster/slide

## Calculating

1. present formulas and calculations clearly and efficiently
2. give the steps of the calculation
3. make explicit the link between the claim made and the calculation underpinning it

## Collaborating

1. participate actively in discussions demonstrating that the student has read the required literature and is able to use it to make a point or give well-grounded reasons for a certain point of view held
2. work with others towards a common goal for a set period.
3. distribute tasks among team members in such a way that individual competences are effectively used and/or developed
4. give constructive feedback (that is feedback that plays the ball rather than the person and allows the receiver of that feedback to improve performance)
5. be open to feedback and use it to improve performance
6. take responsibility for her own tasks and complete them well within the time set
7. take responsibility in a conflict between peers to find a working relationship and describe what was done and how it helped
8. make agreements with peers and tutors regarding planning and deliverables

## Planning & Organizing

1. organize her own activities or activities within a group, so that results are achieved within a predetermined time with the available resources.
2. describe the principles of specific methods of efficient and effective planning and organizing (such as the method of agile scrum)
3. deal with a personal crisis by taking the initiative on time to seek help
4. take and argue a decision taken autonomously by being open to the criticism and advice of others

# Adaptability

Being durably employable requires students to be able to actively prepare for, as well as adapt to, changing (professional) environments and circumstances. This includes personal initiative in study and career planning, as well as being able to study and work in different environments and as such is a prerequisite for life-long learning.

1. To demonstrate openness to the comments and criticisms of others by responding to them in a sensible way, demonstrating an understanding of the issues involved.

## Self-directed Learning

1. Identify and describe personal learning needs
2. Formulate learning goals
3. Identify, choose, and argue appropriate learning activities and strategies
4. Evaluate learning outcomes and describe that evaluation

## Dealing with Uncertainty

anticipate changes and take, describe, and argue decisions while dealing with uncertainty, ambiguity, and risk

## Pro-activity

Identify, list, and describe opportunities and take initiative.

## Innovative Thinking

approach problems from different perspectives, which the student can list and describe and can generate develop and make explicit novel ideas that fit a specific context.

## Systems Thinking

Demonstrate an awareness through description that problems or solutions are part of a greater system and can identify and indicate the interrelations between individual contributions and their boundaries.

# Self- and Social Awareness

To be durably employable, students need awareness of their personal learning purpose and ambitions, strengths, weaknesses, values, and beliefs, including the ability to reflect on these. Reflecting on one’s own learning process and development is essential to gain insight and learn to give and receive (critical) feedback in a constructive way. This aspect also includes the ability to build and be a constructive part of relevant networks and teams, including international ones, and an awareness of societal and ethical issues in relation to engineering problems.

* critically and constructively examine their own thoughts and actions, describing their deliberations, evaluate them, process feedback from others, and use the experiences to guide and argue future thoughts and actions.
* demonstrate awareness through description of how their values, norms, beliefs, ambitions, and expertise (competences, strengths, and weaknesses) shape the type of engineer they can become and of career paths matching their ambitions.
* demonstrate awareness through description of their environment and consider the challenges/problems of society, making these explicit and describe how their actions may impact society.
* demonstrate awareness through description of their own as well as team members’ perspectives and can redirect their own actions based on interactions with others.
* take and motivate decisions after having considered and made explicit different ethical perspectives (including user, society, enterprise, and environment).