

Formulate learning objectives

Follow the **instructions and tips** below to formulate clear and measurable learning objectives. These can be learning objectives for a course, but also for an assignment or teaching activity. Use the attached **Bloom's taxonomy** to find the right verbs for your objectives.

If you have any questions about (re)formulating learning objectives, please contact SEEDS via seeds@science.leidenuniv.nl. We are happy to help you.

Four steps to formulate clear and measurable learning objectives

	Instructions	Example
1	Start with <i>After this course/assignment/activity, students are able to...</i> or <i>Na afloop van dit vak/deze opdracht/deze activiteit, kan de student...</i>	After this course, students are able to...
2	Use a verb of the highest applicable Bloom* level. Lower levels are automatically implied. Avoid vague phrases like <i>have an understanding of</i> or <i>have gained knowledge on</i> .	explain information theory
3	Specify broad terms in brackets or a footnote.	(both algorithmic and Shannon's)
4	If applicable: include conditions (setting, form of product, skills).	in a blog for the general public.

*For more information about Bloom's taxonomy, see below.

For course objectives, you should...

- Formulate at least five objectives and a maximum of 10;
- Make sure that the levels of Bloom you address in your objectives fit the level of the course. On average, Bachelor courses have relatively more lower level objectives; Master courses have relatively more higher level objectives. There are exceptions like e.g. Bachelor thesis courses.

You can also use the [Leiden University's learning objective generator](#) to formulate your objectives.

Bloom's taxonomy for learning objectives

The [taxonomy of educational objectives](#) first designed by Benjamin S. Bloom provides a framework to define what you intend your students to learn during a course, assignment or activity. It contains six cognitive levels with increasing complexity (*fig. 1*). Each level has a list of corresponding verbs that describe what a student should be able to do. Each of these verbs is measurable, meaning that you can test whether a student is performing at the intended cognitive level. Higher cognitive levels imply the lower levels. For example, in order to be able to apply certain knowledge, a student must also be able to remember and understand that knowledge. Using the levels of Bloom and the corresponding verbs in your objectives allows you to more easily create [constructive alignment](#) in your course, assignment or activity.

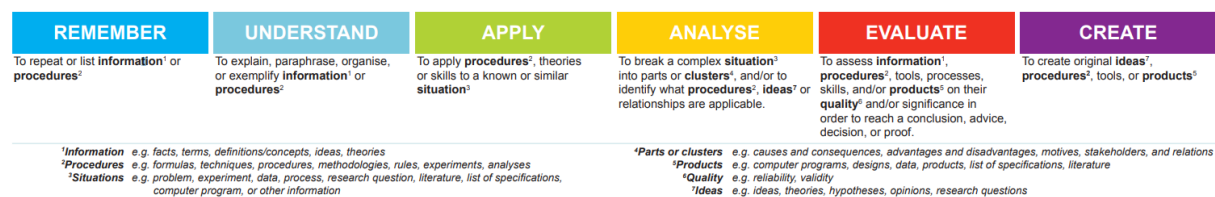


Figure 1. Six cognitive levels of Bloom's taxonomy. This work is licensed under a Creative Commons Attribution 4.0 International License. Please attribute Lisette Harting, Garine Apikian & Wiebe Dijkstra, Delft University of Technology. If you have any feedback please contact the authors. Version: September 2019.

Bloom's Revised Taxonomy for Learning Objectives

REMEMBER	UNDERSTAND	APPLY	ANALYSE	EVALUATE	CREATE
To repeat or list information ¹ or procedures ²	To explain, paraphrase, organise, or exemplify information ¹ or procedures ²	To apply procedures ² , theories or skills to a known or similar situation ³	To break a complex situation ³ into parts or clusters ⁴ , and/or to identify what procedures ² , ideas ⁷ or relationships are applicable.	To assess information ¹ , procedures ² , tools, processes, skills, and/or products ⁵ on their quality ⁶ and/or significance in order to reach a conclusion, advice, decision, or proof.	To create original ideas ⁷ , procedures ² , tools, or products ⁵

¹**Information** e.g. facts, terms, definitions/concepts, ideas, theories

²**Procedures** e.g. formulas, techniques, procedures, methodologies, rules, experiments, analyses

³**Situations** e.g. problem, experiment, data, process, research question, literature, list of specifications, computer program, or other information

⁴**Parts or clusters** e.g. causes and consequences, advantages and disadvantages, motives, stakeholders, and relations

⁵**Products** e.g. computer programs, designs, data, products, list of specifications, literature

⁶**Quality** e.g. reliability, validity

⁷**Ideas** e.g. ideas, theories, hypotheses, opinions, research questions

Example	Example	Example	Example	Example	Example
The student is able to list the steps in the following methods of analysis: interpolation and classification.	The student is able to explain the movement of bony segments of the human skeleton system.	The student is able to calculate the shear and bending moment resistance of pre-stressed concrete structures.	The student is able to derive equations describing the steady-state performance of the vehicles discussed during the course.	The student is able to evaluate the quality of the collected data.	The student is able to design systems engineering solutions through the use of requirements analysis and conceptual designs.

Verbs	Verbs	Verbs	Verbs	Verbs	Verbs
Reproduce: Duplicate, List, Repeat, Reproduce Find/identify in e.g. a figure: Identify ^{AN} , Label, Locate, Name, Recognise, Recall	Give explanation: Discuss ^{AN, EV} Explain ^{EV} Give examples: Give examples, Illustrate ^{AP, CR} In other words: Define, Paraphrase, Rephrase, Restate, Summarise Organise information Categorise ^{AP, AN} , Compar ^{AN} , Contrast ^{AN} , Order ^{AN} , Organise ^{AP, AN}	Apply general: Apply, Administer, Develop ^{CR} , Employ, Perform, Use, Implement, Make use of Apply knowledge: Categorise ^{UN, AN} , Link ^{AN} Apply specific procedures/skills: Assemble, Calculate, Compile ^{CR} , Correlate ^{AN} , Construct ^{CR} , Evaluate, Experiment ^{CR} , Illustrate ^{UN, CR} , Interview, Simulate, Solve ^{AN, EV, CR}	Analyse in general: Analyse, Appraise ^{EV} , Estimate, Examine, Inspect, Investigate, Research, Simplify ^{CR} , Solve ^{AP, EV, CR} Divide: Breakdown, Categorise ^{UN, AP} , Discriminate, Dissect, Divide, Isolate, Prioritise ^{EV} , Order ^{UN} , Organise ^{UN, AP} Arguments (one sided): Criticise ^{EV} , Debate ^{EV} , Discuss ^{UN, EV} , Focus, Highlight, Motivate, Point out, Reason ^{EV} Relationships: Compar ^{UN} , Contrast ^{UN} , Correlate ^{AP} , Infer ^{EV} , Link ^{AP} , Model ^{CR} , Rank, Relate, Reorganise Select applicable procedure/theory/skill: Choose ^{EV} , Identify ^{UN} , Model, Select ^{EV} , Simplify	Taking into consideration: Consider, Deduct, Reason ^{AN} , Value Working towards a conclusion*: Appraise ^{AN} , Assess, Award, Evaluate, Grade, Mark, Rate, Reason ^{AN} , Score, Solve a problem ^{AP, AN, CR} Reaching a conclusion*: Advise, Choose ^{AN} , Conclude, Decide, Determine, Judge, Prioritise ^{AN} , Select ^{AN} Defending a conclusion* (or not): Argue, Convince, Criticise ^{AN} , Debate ^{AN} , Disprove, Dispute, Influence, Justify, Persuade, Prove, Reason ^{AN} , Recommend, Support, Validate Discuss consequences/significance of conclusion*: Discuss ^{AN, UN} , Explain (results, consequences for stakeholders, society, etc.) ^{UN} , Induce, Infer ^{AN} ,	Make something new: Compose, Create, Design, Develop ^{AP} , Discover, Experiment ^{AP} , Invent, Plan Change something: Adapt, Change, Innovate, Modify, Reframe, Revise, Simplify ^{AN} , Substitute, Transform Add something: Add to, Elaborate, Extend Improve something: Improve, Maximise, Minimise Combine some things: Combine, Compile ^{AP} , Integrate New ideas: Formulate, Hypothesise, Originate, Propose, Speculate, Suggest, Theorise Construct: Construct ^{AP} , Illustrate ^{UN, AP} , Draw, Visualise Other: Model ^{AN} , Solve ^{AP, AN, EV} , Program

^{UN, AP, AN, EV, CR} Some verbs can be used in multiple levels of the taxonomy. This is indicated with the superscripts: UNderstand, APply, ANalyse, EValuate or CReate. The verbs used in this document are a selection of the possibilities. You can also use other verbs.

Products	Products	Products	Products	Products	Products
Definition Fact Label List Reproduction Quotes	Categorisation Collection Closed questions (e.g. true/false, multiple choice) Examples Explanation Outline Summary Devise a wiki entry	Demonstration (e.g. video) Illustration Interview Performance Presentation Role play Simulation Use formulas, programs, rules, procedure, techniques Calculation	Abstract Analysis of a case/situation Case presentation Chart Checklist Discussion of the (quality of) results' Graph Observation of professional practice Peer feedback Report Spreadsheet Survey	Advise Case presentation Comment Conclusion Discussion/debate Essay Evaluation Judgement Opinion Recommendation Report Review Verdict	Computer program Design plan/blueprint/scheme/drawings Exam questions Game Paper Plan Portfolio Project Prototype Research proposal



Niveau	Werkwoorden – Na dit vak kan de student.....
1.onthouden	herkennen, identificeren, citeren, herinneren, benoemen, verwoorden, beschrijven, definiëren labels, opsommen, ordenen, maak overzicht
2.begrijpen	Interpreteren, verduidelijken, herformuleren, weergeven, vertalen, identificeren, toelichten, illustreren, waarderen, uitleggen, classificeren, categoriseren, hergroeperen, selecteren, samenvatten, onttrekken, generaliseren, afleiden, concluderen, extrapoleren, interpoleren, voorspellen, vergelijken, contrasteren, indelen, matchen, vergelijken, verklaren modelleren, geef argumenten, stel prioriteiten
3.toepassen	Uitvoeren, toepassen, illustreren, bewerken, implementeren, gebruiken, geef oplossing (oplossen), berekenen, demonstreren, maken, ontwikkelen, organiseren, produceren, relateren, veranderen, verklaren, voorbereiden, wijzigen, interpreteren
4.analyseren	Differentiëren, discrimineren, onderscheiden, focussen, selecteren, organiseren, integreren, schetsen, classificeren, structureren, toewijzen, ontleden, vergelijken, deduceren, illustreren, toetsen, overzicht maken, experimenteren, indelen, uitrekenen
5.evalueren	checken, coördineren, opsporen, monitoren, meten, scoren, bekritisieren, beoordelen, concluderen, contrasteren, interpreteren, ondersteunen, rechtvaardigen, valideren, verdedigen, vergelijken, waarderen, voorspellen, beargumenteren, kiezen
6.creëren	genereren, veronderstellen, samenstellen, plannen ontwikkelen, organiseren, produceren, construeren, categoriseren, componeren, formuleren, herschrijven, maken (plan of voorstel), ontwerpen, samenvatten

Bloom's taxonomy – example test questions for different levels

