

# Computational thinking in “IT design and application development” (iDA)

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## Challenges

- Students enter with poor CT skills,
- Increase skills in programming and systems development,
- Increase employability,
- Increase sense of belonging.

## Underwent Activities

- Roll out of the new study regulation,
- Creation of new teaching materials,
- In-depth interviews with 14 iDA students,
- Creation of two new Design Studios accessible only by the iDA students,
- Roll out of a new iDA student organization.

## Sources

Informatik og computational thinking – IT-Vest.  
Google for Education – CT Overview  
Microsoft Education – Basics of CT  
Harvard CS50

## Initial results from Introducing CT\*

### a) The new P0/CT module (10 ECTS):

- Students use a subset of CT concepts (algorithm design, abstraction, automation, pattern recognition, simulation, formalization) to model a problem that is related to their Bachelor,
- P0 groups are created using an algorithm based on students’ profile similarities, and P7 groups based on dissimilarities,
- We observed an increased understanding of CT terms, better exam performance, and increased confidence.

### b) The new Introduction to Programming course (5 ECTS)

- Students extend their CT knowledge through a flipped MOOC (Harvard CS50) and learn to program in C, Python and Web technologies in hands-on programming sessions with the lecturer. They have to apply the acquired programming knowledge in P7 project
- We observed better exam performance, better performance in the Foundational OO Programming course, better utilization of programming and CT in both P7 and P8 projects
- Students start programming in other languages (e.g. Android) and are less afraid to demonstrate their working prototypes.

## The new iDA study regulation

7 <sup>th</sup>	Computational Thinking and P0 10 ECTS	P7 Project 10 ECTS	Introduction to Programming 5 ECTS	Information and Organization 5 ECTS
8 <sup>th</sup>	P8 (with SDGs) 15 ECTS	Systems Development 5 ECTS	Design and Evaluation of User Interfaces 5 ECTS	Foundational OO programming 5 ECTS
9 <sup>th</sup>	P9 (with companies) 15 ECTS	Agile Software Engineering 5 ECTS	Database Development 5 ECTS	Entrepreneurship 5 ECTS
10 <sup>th</sup>	Thesis, 30 ECTS			

\*1st year of deployment, data collected from 7<sup>th</sup> and 8<sup>th</sup> semester students

## Future Steps

- Focus on 9<sup>th</sup> and 10<sup>th</sup> semester. What is the effect of the changes?
- Monitor 7<sup>th</sup> and 8<sup>th</sup> semester. Is there a need to adjust?
- Rollout of the iDA EXPO on the 10<sup>th</sup> semester,
- Collect real data on the effect of the changes on employability,
- Empower the iDA student organization,
- Study the effect of bringing real-world cases from companies on P9,
- Study the effect of working with UN’s Sustainable Development Goals on P8
- Bring the iDA alumni closer to the new students and the department,
- Develop a branding strategy for the new iDA education

## IT Design and Application Development (IDA), cand.it.

Entry with bachelor degree in various disciplines (not IT) and no mathematical training.

Two-year education with project-organized problem-oriented studies, PBL.

Learning goals: Knowledge, skills, and competencies in Programming, Systems Thinking, Computational Thinking, Digitalization, Human Computer Interaction, Design and evaluation of IT systems.



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