KU LEUVEN

CYBPHYS

Implementation of Innovative ICT based Teaching & Learning Methods (related to WP3)

Practical arrangement of student training in COVID-19 conditions.

Joan Peuteman

ZOOM meeting: December 7th (2020).

Erasmus+: Development of practically-oriented student-centred education in the field of modelling of Cyber-Physical Systems (CybPhys)

Co-funded by the Erasmus+ Programme of the European Union

Table of content

The COVID-19 pandemic in Belgium

COVID-19 pandemic at a university level

A didactical challenge

Didactical implementation

Satisfaction of the teaching staff

Satisfaction of the students

Examination results

Academic year 2020-2021

Co-funded by the
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The COVID-19 pandemic in Belgium

The worldwide **pandemic** of the coronavirus resulted in **Belgium** in a large number of patients.

- The first case has been detected on February 4th, 2020.
- The first fatality has been reported on March 11th, 2020.
- **Mid April 2020, the first wave of the pandemic reached a peak** (e.g. 344 fatalities on April 12th, 2020).
- After the peak of April, a decline in the number of infections and fatalities appeared.
- A small second peak occured in July 2020, but especially **from mid October 2020 a real second peak in the number of infections occured**.

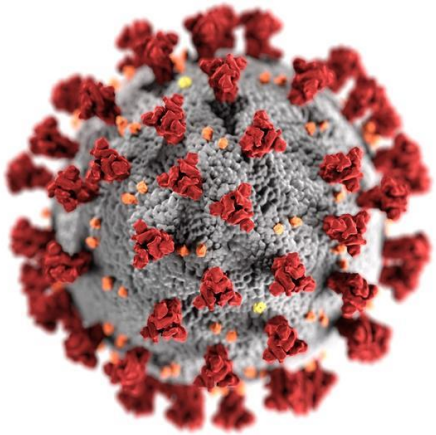
The COVID-19 pandemic in Belgium

During the second half of academic year 2019-2020, the **government took drastic measures** to reduce the number of infections. E.g.

- March 10th 2020: secondary schools were advised to cancel trips abroad and multi-day excursions.
- March12th 2020: primary and secondary schools were closed down.
- March 17th 2020: **a "weak" lockdown was imposed on the entire country**.

The COVID-19 pandemic in Belgium

The drastic measures taken by the government in March to reduce the number of infections has been extended a number of times.



- **From April 2020, a gradual lockdown exit strategy has been implemented.**
- From May 18th 2020 onward, a gradual re-opening of primary and secondary schools was allowed again.

Table of content

The COVID-19 pandemic in Belgium

COVID-19 pandemic at a university level

A didactical challenge

Didactical implementation

Satisfaction of the teaching staff

Satisfaction of the students

Examination results

Academic year 2020-2021

Co-funded by the
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COVID-19 pandemic at a university level

The impact of the lockdown on the second half of academic year 2019-2020 was large.

We focus on **KU Leuven Campus Bruges**.

COVID-19 pandemic at a university level

At KU Leuven Campus Bruges, so-called ‘industrial engineers’ are trained:

- students face a scientific and technological curriculum,
- **exercises and laboratory sessions are important**.

From March 10th, a number of approaches have been planned:

- **Stimulate online teaching**.
- Laboratory sessions were still possible, but physical distance between the students was required.

COVID-19 pandemic at a university level

The stricter orders of the government from March 12th 2020 implied that from Monday March 16th, **all life educational activities were cancelled**.

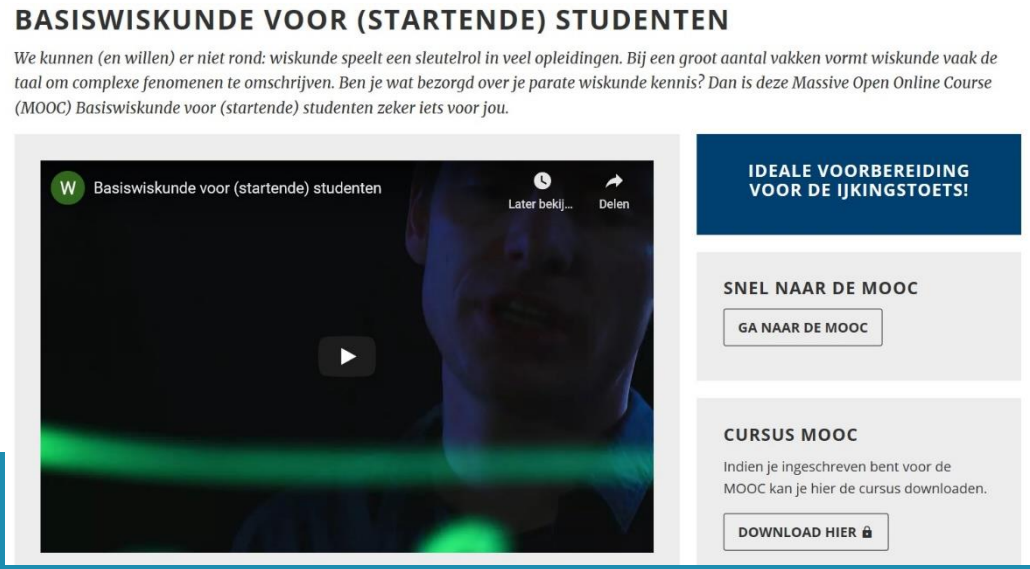
From March 20th, it was clear the life educational activities needed to be cancelled **for the entire academic year**.

COVID-19 pandemic at a university level

At KU Leuven University, at engineering faculties, at KU Leuven Campus Bruges, **experience exists concerning online and digital teaching and learning**.

Experience with Erasmus+ projects.

Experience with MOOC-development.



COVID-19 pandemic at a university level

Educational technology: TECOL project.

But **implementing online digital educational** and **pedagogical approaches for all courses, by all members of the teaching staff** and **for all students** was a challenge.

Table of content

The COVID-19 pandemic in Belgium

COVID-19 pandemic at a university level

A didactical challenge

Didactical implementation

Satisfaction of the teaching staff

Satisfaction of the students

Examination results

Academic year 2020-2021

Co-funded by the
Erasmus+ Programme
of the European Union

A didactical challenge

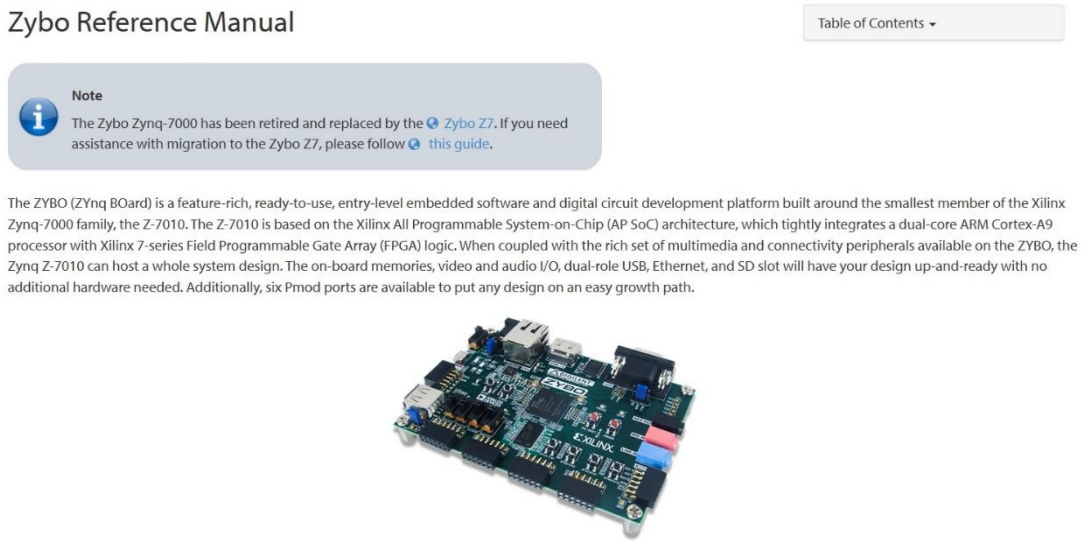
A challenge for the **support services** of the teaching staff

- supporting the teaching staff from a **technical** and a **didactical** point of view,
- providing the **increased bandwidth needs**
  - live streaming: e.g. with Skype for Business
  - asynchronous streaming videos
  - Virtual Learning Environment
- **organizing the online courses** (students must be able to follow the courses and teachers must be able to teach them)

A didactical challenge

A challenge for the **students**

- Students mainly need psychological support and **coaching**.
- Students need to be prepared for the **examinations**.
- Students need to deal with the **alternatives for the laboratory sessions**.
- Students need to prepare themselves for their **future career**.



A didactical challenge

A challenge for the **students realizing their master thesis**

- Students were not able to finalize their **internship**.
- Students faced the problem that all activities in **research laboratories** or **industry** were cancelled.

Live discussions between promotor and students are not possible anymore.

A didactical challenge

A challenge for the **students realizing their master thesis**

- Often, the content/goals of the master thesis had to be redefined:
  - perform **measurements** which can be realized **at home**,
  - increase the importance of **simulation based research**,
  - increase the importance of **literature reviews**,
  - allow **distance coaching** by the promotors.

A didactical challenge

A challenge for the **teaching staff**

- replacing the traditional blackboard,
- facing live didactical sessions using a PC,
- using **live streaming** (e.g. with Skype for Business),
- using a **Virtual Learning Environment**,
- realizing flipped classroom sessions,
- finding **alternatives for laboratory sessions and exercises**,
- **evaluating** the alternatives for the laboratory sessions
- …

Table of content

The COVID-19 pandemic in Belgium

COVID-19 pandemic at a university level

A didactical challenge

Didactical implementation

Satisfaction of the teaching staff

Satisfaction of the students

Examination results

Academic year 2020-2021

Co-funded by the
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of the European Union

Didactical implementation

Different members of the teaching staff use **different approaches** to realize online learning and distance learning:

The chosen approach	yes	no
Live streaming (Skype for Business, Zoom, ...)	55.6%	44.4%
Video distribution platform of class recordings (named Kaltura at KU Leuven)	55.6%	44.4%
Virtual Learning Environment (Blackboard - Toledo, Moodle)	100%	0%
Independent self tuition	25.9%	74.1%
Flipped classroom	11.1%	88.9%
Assignment replacing regular course activities	25.9%	74.1%
Remote laboratory sessions	18.5%	81.5%
• Laboratory setup remotely controlled	7.4%	92.6%
• Laboratory setup controlled by member of the teaching staff	14.8%	85.2%
Providing laboratory equipment to the students' private households	11.1%	88.9%
Cancelling (part of) a course activity	11.1%	88.9%

Didactical implementation

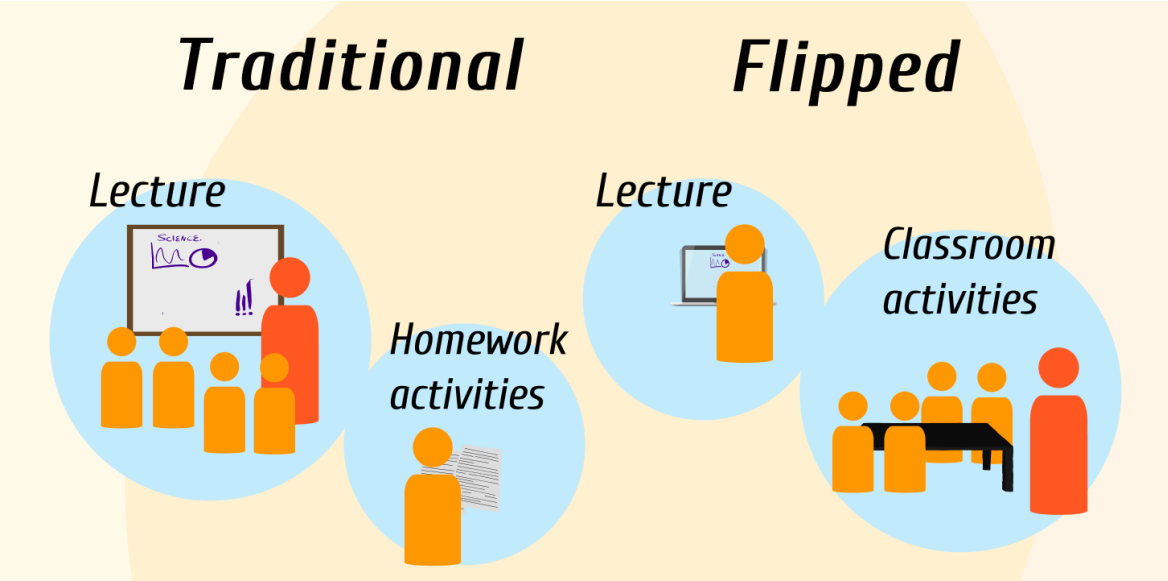
The **Virtual Learning Enviroment** has been used by all members of the teaching staff: no surprise.

Live Streaming (e.g. Skype for Business, Zoom) is also popular, before the COVID-19 pandemic it was already popular to organize meetings.

A **Video Distribution Platform** is also popular, asynchronous streaming videos allow a large flexibility for teaching staff and students.

Didactical implementation

Independent **self-tuition** or the **flipped classroom** concept is less popular. Cancelling courses has been avoided as much as possible.



Didactical implementation

In general, realizing **remote laboratories** is a larger challenge.

- The use of a **remotely controlled laboratory setup** is nice but often difficult to realize.
- Laboratory setups are generally **controlled by a member of the teaching staff**. Using a webcam or asynchronous video streaming provides opportunities.
- In case smaller laboratory equipment is needed (e.g. electronics-ICT oriented), providing **laboratory equipment to the students' private households** can be a solution.

Table of content

The COVID-19 pandemic in Belgium

COVID-19 pandemic at a university level

A didactical challenge

Didactical implementation

Satisfaction of the teaching staff

Satisfaction of the students

Examination results

Academic year 2020-2021

Co-funded by the
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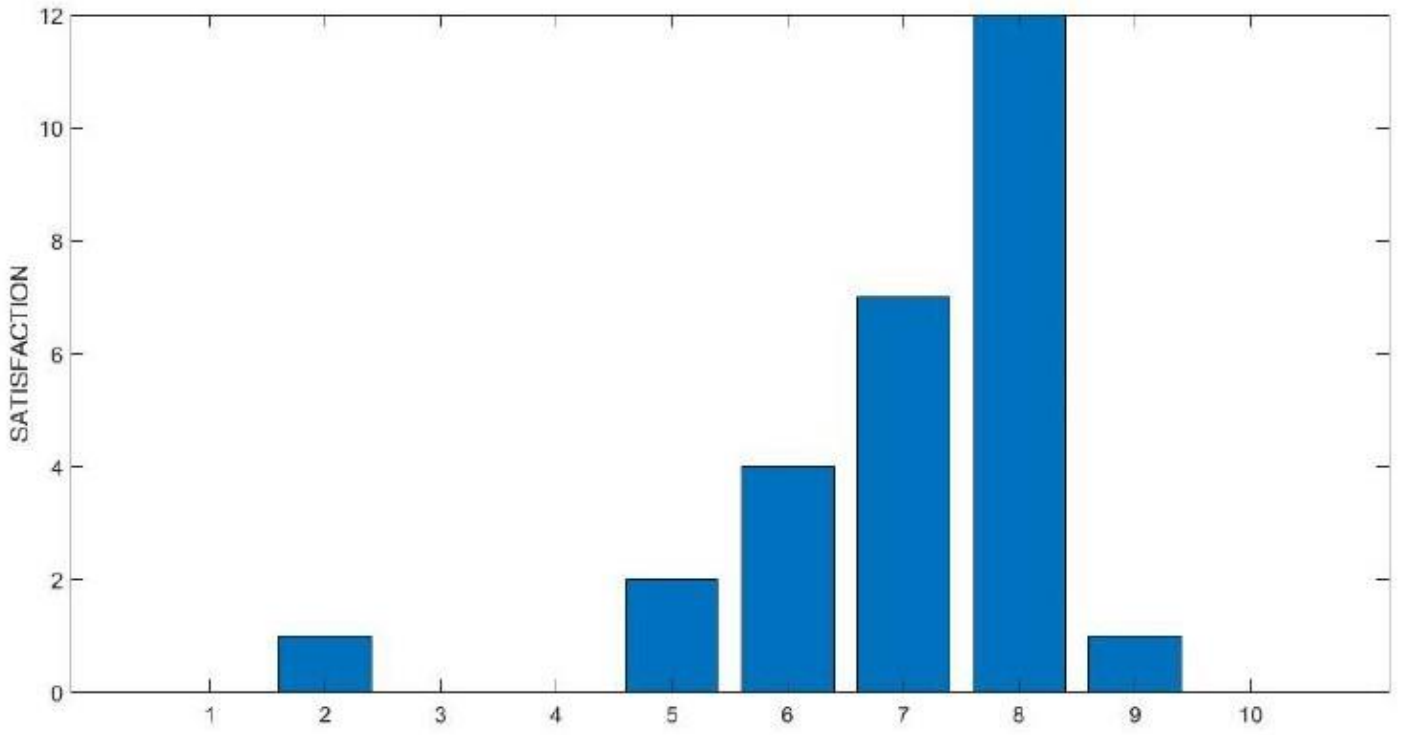
of the European Union

Satisfaction of the teaching staff

The global **satisfaction** among the teaching staff concerning the digital education approach **is quite high**:



Satisfaction of the teaching staff

The **willingness to repeat** (entirely or partially) the digital education approach in “normal” situations is smaller.

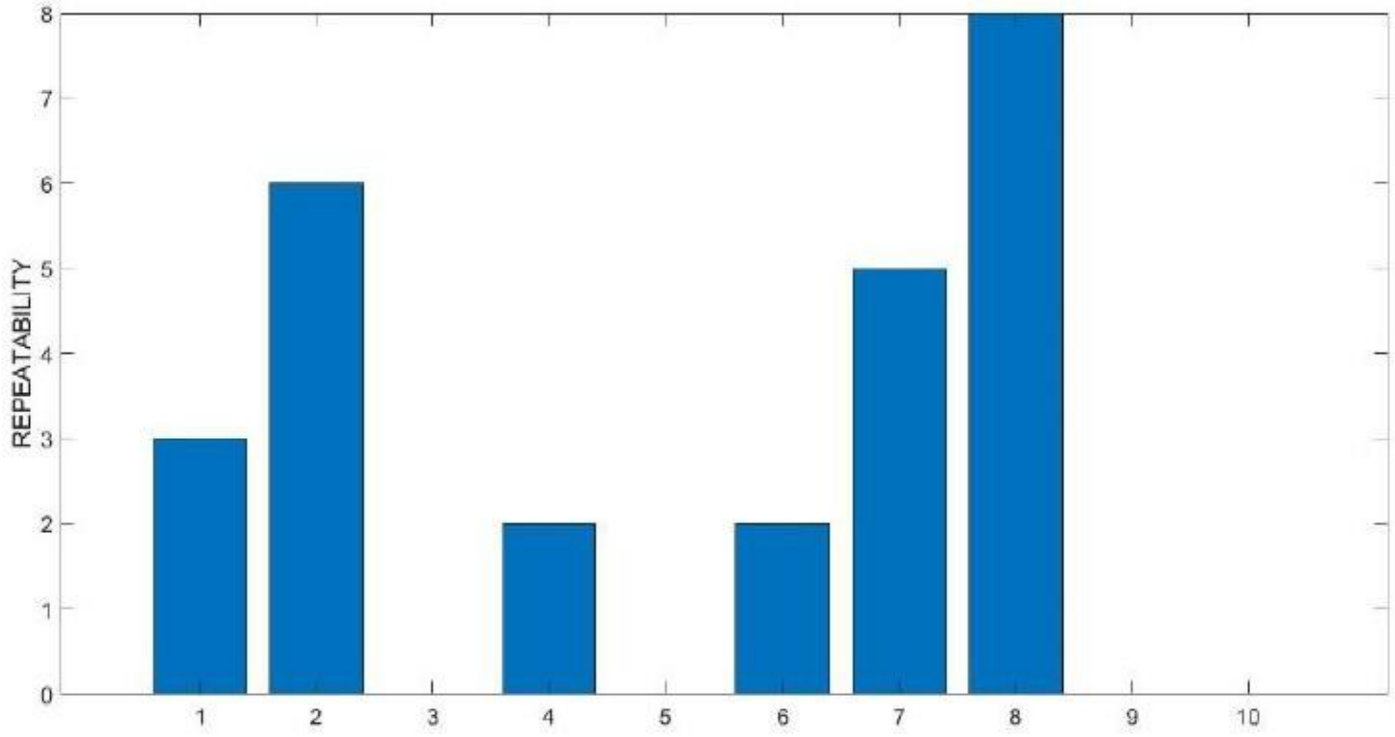


Table of content

The COVID-19 pandemic in Belgium

COVID-19 pandemic at a university level

A didactical challenge

Didactical implementation

Satisfaction of the teaching staff

Satisfaction of the students

Examination results

Academic year 2020-2021

Co-funded by the
Erasmus+ Programme
of the European Union

Satisfaction of the students

Mid-May 2020, a **survey** has been performed among the students (after 2 months of digital distance learning).

	totally agree	agree	rather disagree	totally disagree
When studying the online courses, I am able to respect the required time schedule.	12.7%	23.9%	40.9%	22.5%
I find the necessary time to study for the examinations.	4.2%	23.9%	46.5%	25.4%
When considering the synchronous online courses and the asynchronous streaming videos, I understand the content of the courses.	7%	63.4%	28.2%	1.4%
In general, it is clear what I have to study to be prepared for the examinations.	4.2%	60.6%	33.8%	1.4%
I think the COVID-19 measures will have no impact on the results of my examinations.	5.7%	19.7%	57.7%	16.9%
I am concerned about the exams of June.	39.4%	39.4%	21.2%	0%
Due to the COVID-19 measures, it is difficult to motivate myself to study.	38%	42.3%	16.9%	2.8%

Satisfaction of the students

Time-management is a challenge for the students.

- Students **lack** the **time-related structure** provided by regular courses.
  - Courses are provided asynchronously, laboratory sessions are replaced by project work, …
- **Replacing laboratory sessions** by project work is not easy. The assignments of the projects were sometimes late.

In general, students were **concerned about the exams**, they feared a negative impact of the COVID-19 pandemic.

(the teaching staff shared that concern)

Satisfaction of the students

A second survey has been organized among students of the entire Faculty of Engineering Technology (not only KU Leuven Campus Bruges).

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In general

- students prefer courses recorded without live audience,
- students like live lectures,
- students like recorded lectures of previous years.

Self-study packages are much less popular. This is also the case when focusing to laboratory sessions.

Satisfaction of the students

In general, students reveal

- The digital educational approach allowed them to **work at their own pace.**
- They didn’t have to travel between home and the campus which saves time.
- They were able to **study larger entities as a whole**.

Satisfaction of the students

Are the students interested in digital distance learning in absence of a COVID-19 pandemic?

- 14% of the students want no distance learning at all,
- 28% of the students agree with something between 0% and 20% of the contact hours by distance learning,
- 27% of the students agree with something between 20% and 40% of the contact hours by distance learning,
- 17% of the students agree with something between 40% and 60% of the contact hours by distance learning
- 9% of the students agree with something between 60% and 80% of the contact hours by distance learning
- 5% of the students agree with something between 80% and 100% of the contact hours by distance learning or even with all courses based on distance learning.

Table of content

The COVID-19 pandemic in Belgium

COVID-19 pandemic at a university level

A didactical challenge

Didactical implementation

Satisfaction of the teaching staff

Satisfaction of the students

Examination results

Academic year 2020-2021

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Examination results

As already mentioned, a lot of students and members of the teaching staff were **concerned about the examination results**.

But…

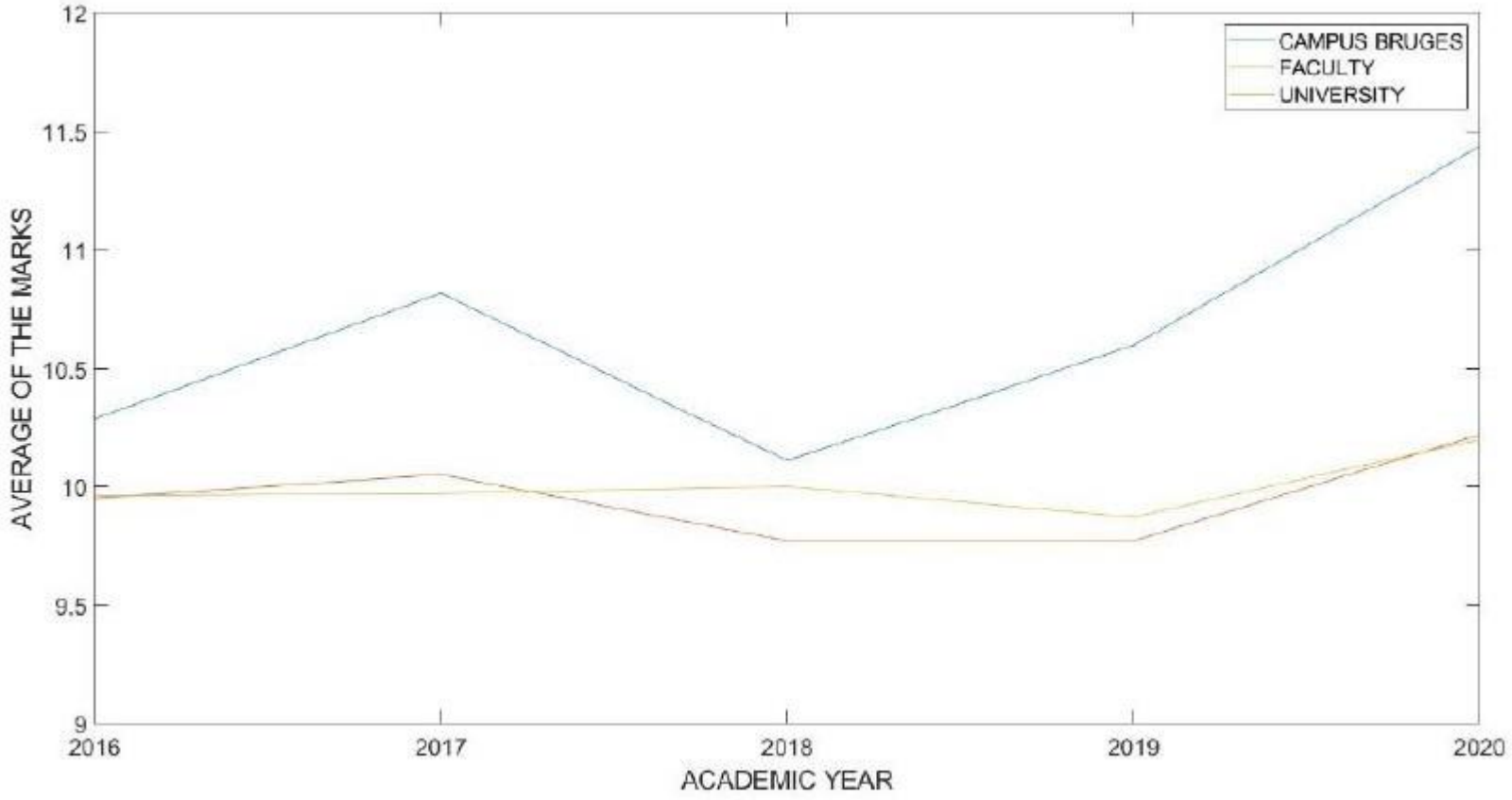
the marks were even higher than the previous years.

Such a result has not only been observed at KU Leuven Campus Bruges but also at the entire faculty and the entire university (and other universities).

Also the, more vulnerable, first year students obtained decent marks.

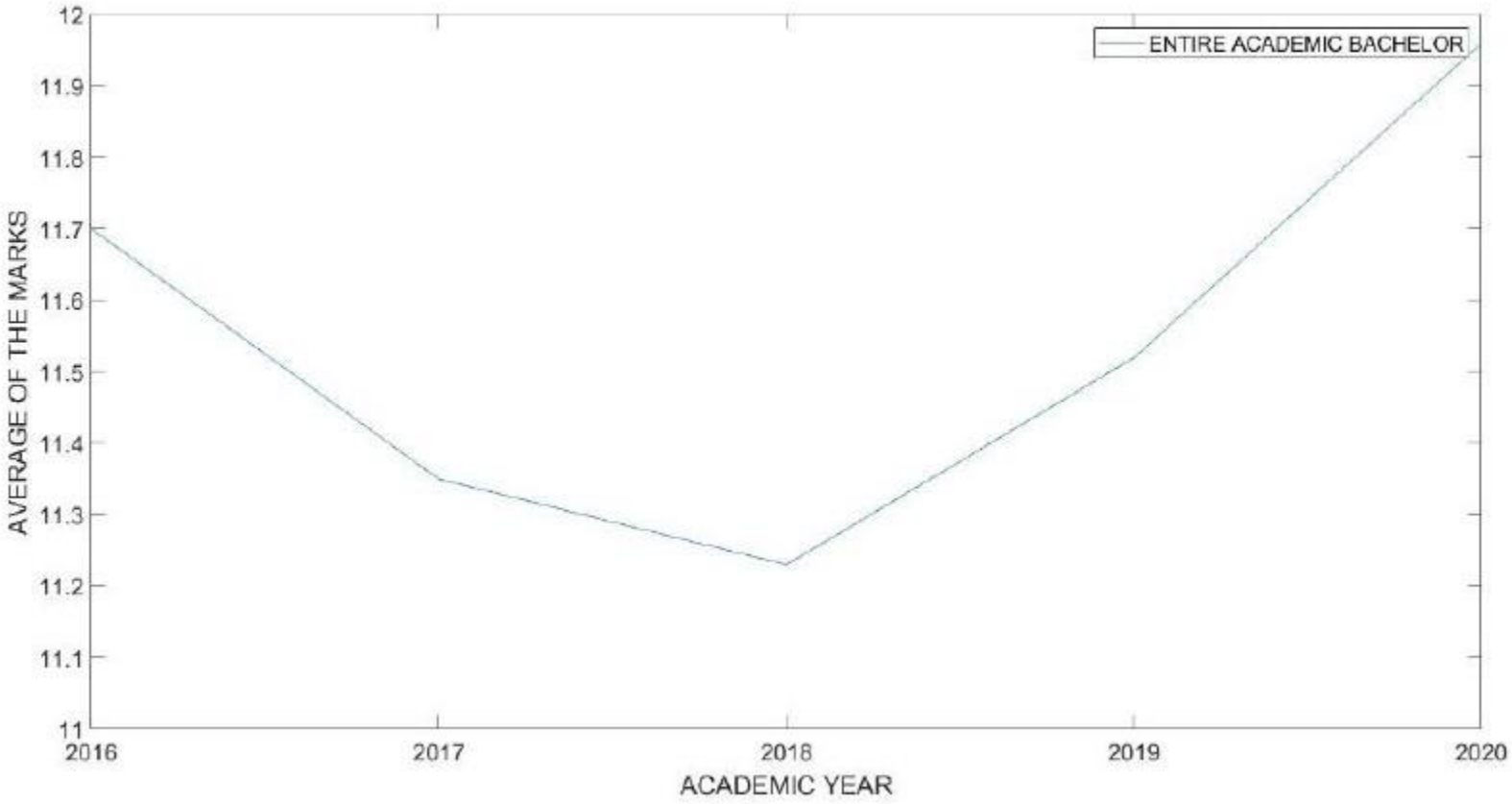
Examination results

Evolution of the marks of the **first year students**:



Examination results

Evolution of the marks of the **bachelor students**:



Examination results

When considering the **master thesis**, problems have risen.

- **Internships had to be interrupted**, research laboratories needed to close down.
- **No physical contact** between promotors and students was allowed.
- More **simulation based results** were needed (instead of measurements at the laboratory).
- **Live streaming** has been used to allow students **to defend their work** in front of the jury.
- …

Examination results

When considering the marks of the master theses. There are deviations from year to year but **the results of June 2020 are not different from the marks given the years before**.

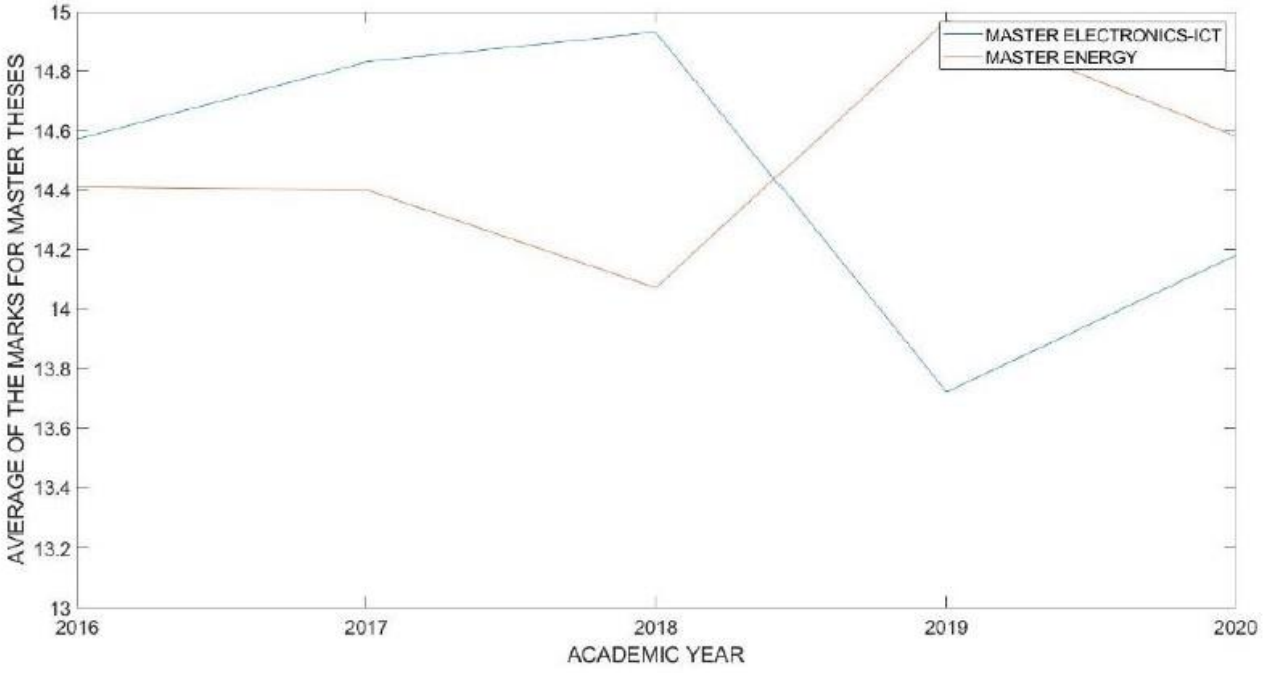


Table of content

The COVID-19 pandemic in Belgium

COVID-19 pandemic at a university level

A didactical challenge

Didactical implementation

Satisfaction of the teaching staff

Satisfaction of the students

Examination results

Academic year 2020-2021

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Erasmus+ Programme
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Academic year 2020-2021

In the **first semester of academic year 2020-2021** a blended approach is used.

- **Exercises and laboratory** sessions are organized as ‘normal’ as possible (although there was an interruption due to the second wave).
- Some **theory sessions** are taught in a regular classroom using a traditional blackboard… (and have been interrupted midway)
- Quite a lot of **theory courses** are still taught using digital distance learning.

We will discuss the first semester of academic year 2020-2021 in a separate presentation.

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Thank your for your attention!

Questions?

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