First Year Masters Challenge in the Corona Semester White Paper

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ABSTRACT

In this white paper, we share our experience with a first year Masters course preparation and implementation during the Corona semester in summer 2020. The main challenge of this course was to deal with students, who have been accepted for graduate studies at the Masters level at the University of Bremen, Germany, but did not arrive in Germany on time due to the Corona crisis lockdown. We have experienced many technical, organisational and didactical problems, some of which we managed to successfully solve and enable the students to finish one of their courses remotely.

1 INTRODUCTION AND BACKGROUND

In this white paper, we discuss our experience with a new course taught for first year Master students, part of the Communication and Information Technology (CIT) studies at the Faculty of Electrical Engineering at the University of Bremen1. This course of studies starts traditionally in the summer semester and thus differs from usual starting times in Germany in the fall. This is due to its very international nature: Classes are taught in English and more than 90% of the accepted students are non-Germans, arriving from the developing world. Especially, the visa application process takes long and thus a start in the summer semester is more practical.

The semester started with one week delay on April 20th and almost none of the our 45 accepted students were able to arrive in Germany before the lockdown.

1https://www.uni-bremen.de/msc-cit-cmm

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2 COURSE PLANNING

The original planning of the course is depicted in Table 1. We have planned for a total of three topical blocks, focusing on wireless sensor networks (WSN) [2], vehicular networks (VANET) [1], and opportunistic networks (OppNets) [4, 5] and one additional block on research paper presentation. Each of the topical blocks was planned to start with a Project-based Learning (PBL) [3] task, followed by an in-class lecture with Socrative exercises (anonymous clicker-like exercises through socrative.com), home readings and finally, one week of intensive in-class group assignments. The group assignments were planned to be either simulation-based for VANETs and OppNets with the discrete event simulator OMNeT++ or to be pen-and-paper based exercises for WSNs.

However, Corona forced us to re-think and re-structure our class. Following are the main considerations and the respective changes in the planning.

2.1 No previous experience with PBL

In fact, we planned to use PBL for the first time in this class. Since we could rely on previous experiences with non-PBL format, we decided to postpone it to post-Corona semesters.

## Table 1: The original teaching plan

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to ENC and PBL method</td>
<td>In-class presentation</td>
</tr>
<tr>
<td></td>
<td>Block 1: Wireless sensor networks</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Design an agricultural sensor network</td>
<td>In-class PBL session</td>
</tr>
<tr>
<td></td>
<td>- Research paper reading about WSNs</td>
<td>at home reading assignment</td>
</tr>
<tr>
<td>3 – 4</td>
<td>Introduction to WSNs: technologies, resource considerations, networking.</td>
<td>In-class lecture with Socrative questions</td>
</tr>
<tr>
<td></td>
<td>- In-depth readings about WSNs</td>
<td>at home reading assignment</td>
</tr>
<tr>
<td>5</td>
<td>Design an agricultural sensor network</td>
<td>In-class group assignment</td>
</tr>
<tr>
<td></td>
<td>Block 2: Vehicular networks</td>
<td></td>
</tr>
<tr>
<td>6 – 9</td>
<td>Same format as above</td>
<td>PBL, in-class lectures, home readings, in-class assignment</td>
</tr>
<tr>
<td></td>
<td>Block 3: Opportunistic networks</td>
<td></td>
</tr>
<tr>
<td>10 – 13</td>
<td>Same format as above</td>
<td>PBL, in-class lectures, home readings, in-class assignment</td>
</tr>
<tr>
<td></td>
<td>Block 4: Research paper presentation</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Research paper presentation</td>
<td>In-class student presentation</td>
</tr>
</tbody>
</table>

### 2.2 Low-quality Internet connectivity of students

Since our students did not arrive in Bremen and most of them are still residing with their families mostly in South Asia, we could not rely on good Internet connectivity for synchronous lecturing. Thus, we decided to design the individual topical blocks as a series of short video lectures with online graded exercises.

Figure 1 shows a screenshot of the used online learning platform, called EduWorks. It has been developed by the Zentrum für Multimedia in der Lehre (ZMML) at the University of Bremen and is a module for the StudIP platform\(^3\), which is widely used in Germany. It shows one topic (WSNs) with all its sub-topics as tabs, where in each tab there is one or more content videos and one or several exercises.

The students were expected to follow the structure online, watching the videos and submitting the online exercises. Once per week, we offered online consultation hours over Zoom\(^4\) to enable students to talk to us and to clarify questions. The forum and traditional emails were also available for communication.

However, from 35 registered students, who also submitted exercises regularly, only few used the consultation hours. The forum was almost unused and also email communication was rather minimal. This experience is different from other courses during the Corona semester, where students were communicating more. We believe the reasons are purely psychological and very complex. On one side, students do not know each other and do not wish to make a negative impression by posting perceived “stupid” questions on the forum. On the other side, cultural reasons make it difficult for them in general to ask questions, since that also might be seen negatively (at least they feel so) and thus, direct communication to us is difficult. This is very different in an on-site setup, where we encourage them continuously to ask questions, observe their progress closely and even define questions for them.

We also observed that most of the questions we received were about software problems with the simulations. After these discussions have started, the psychological threshold for asking questions was definitely lowered and more and more students joined. However, we could only guess the problems and thus the possible solutions.

There are many ways of fostering communication over the forum and over the Zoom video conferences, such as interaction games, personal presentations, etc. For example, we could ask for short background presentations from each student in the beginning of the semester. Forum activity can even become part of the grading policy. In this semester, we decided for mostly asynchronous teaching due to expected Internet connectivity problems. However, this aspect might not be as important as proper communication during class and more synchronous communication needs to be planned.

### 2.3 Tools

Usually, for our other courses, we make on-line videos. To do that, we have a recording studio at the university. But because of the lockdown, we had no access to the recording studio. We had to deal with the resources we had at home to record videos and edit them with the tools we had. Since the course preparation was a collective effort (of all departmental academic staff) and since each staff member had their preferred operating systems, the tools used and the associated issues were different. Figure 2 shows the list of tools used by staff members, working on macOS, Windows and Linux.

\(^3\)[www.studip.de](https://www.studip.de)

\(^4\)[https://zoom.us](https://zoom.us)
Open Broadcaster Software (OBS)\(^5\), Filmora\(^6\) and Camtasia\(^7\) are video, audio and desktop capturing tools. RecordMyDesktop\(^8\) is a desktop capture tool. iMovie\(^9\) is a video editing tool. Audacity\(^10\) is an audio capture and editing tool. KDEnLive\(^11\) is a video editing tool. Some of these tools are available for multiple operating systems.

On one side, we could not really help each other with technical problems and we had to "re-invent the wheel" three times for each operating system. On the other side, we had support from our colleagues from ZMML and from other universities and exchange was very informal, quick and productive. At the end, all videos were recorded on time and with a comparable quality.

For our course, but in general. For example, students at the University of Bremen are required to register for exams by a certain deadline towards the end of the semester. Even though this course had no exams (only graded in-class assignments), the students were still required to register to obtain their grades. This registration is done online and includes using a TAN number, which they need to pick-up in person from the examination office. The examination office cannot send them via snail mail due to unreliable mailing services in many countries. Sending them by email is not allowed due to legal reasons. Thus, many students were not able to register on time, which affects their general planning.

For other registration and account services, such as access to StudIP and EduWorks, the administration was very cooperative and quick and enabled the students to remotely register on time.

### 2.4 Procrastination and deadlines

Students had three weeks per topical block and exercise deadlines were all set to the end of the block. Unfortunately, they procrastinated and started working on their exercises too late, which was a problem especially for time-consuming tasks such as running simulations. Students underestimated the time effort needed for installing and running a simulator. This observation is not new, but combined with missing communication led to students dropping out. We decided to try a new strategy and set more fine-grained deadlines for the exercises, so that students would have deadlines every week instead of every three weeks. Indeed, communication improved, more students connected to the consultation hours and no students dropped out.

### 2.5 Administrative issues

Finally, there were also various administrative problems, not only for our course, but in general. For example, students at the University of Bremen are required to register for exams by a certain

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\(^5\)https://obsproject.com
\(^6\)https://filmora.wondershare.com/de/
\(^7\)https://www.techsmith.com/video-editor.html
\(^8\)http://recordmydesktop.sourceforge.net/about.php
\(^9\)https://www.apple.com/imovie/
\(^10\)https://filmora.wondershare.com/de/
\(^11\)https://www.audacityteam.org
\(^12\)https://kdenlive.org/en/
Fifty percent of the responses from the survey was in favour of classical classroom based learning as they believe that they would have been able to learn more in terms of material and discussions related to the topic (see Figure 3b). A small part of the responders preferred online courses over classical classroom learning.

In general, all the responses showed that the students found the videos, the materials and the exercises acceptable and useful for the current situation (see Figure 3c to Figure 3f).

In Figure 3g, we see that students would have preferred for us to have covered more subject area in terms of depth. This again is a lesson learnt for us to increase the rigorousness of the content, which, as mentioned above was lowered due to our concern of overwhelming the students.

4 DISCUSSION AND OUTLOOK

In general, the course on Emerging Networking Concepts went very well and we are pleased with the results, considering the situation. Students were motivated and dealt well with technical problems. The only real problem we faced was the missing or almost missing communication between students and lecturers, although this improved somewhat over time.

Our main objective when designing the course for the Corona semester was to enable as many students as possible to join and successfully take the course. Our main consideration was Internet connectivity, so we designed everything to be asynchronous, so that students can download videos and upload exercises any time. However, while the consideration and the resulting decisions were surely valid, the trade-off between communication and accessibility needs to be evaluated deeper. Experience from other colleagues showed that students “make it work” when it is necessary, i.e. they find a good Internet connection when they need to. This is an interesting observation, since pre-class surveys among students show a different picture.

In summary, we clearly observed one well-known dilemma: make the course flexible, accessible and fair to all or be more demanding? For example, following closely a book is very comfortable for all, who have access to this book – but what about the others? Challenging the students with more and deeper content is surely good for good students – but what about the ones having Corona-related problems and thus not performing at their best? Offering synchronous lectures over video conferencing tools is surely better for understanding and discussing the contents – but what about the ones, whose Internet connections keep dropping? All these questions need to be evaluated individually (see also the previous paragraph) and carefully taken into account to enable a good tradeoff between fairness and quality.

The next fall semester 2020/21 in Germany is planned again as mostly online. While on-site classes will be allowed, hygienic restrictions will make it impossible to run all classes as in pre-Corona times. The ENC course will only take place again in the next summer semester. However, it is worth sketching a new mixed online/on-site plan in case of need. We plan to introduce the PBL sessions on-site, probably separating the students into smaller groups and bigger rooms. Video lectures and online exercises can be done at home, which will free up slots on-site, e.g. for time separation of PBL sessions or in-class assignments. Also in-class group assignments should be prepared at home and then finalised in class. This mixture will hopefully make it possible to enable good communication among students and lecturers, while keeping physical presence at a minimum.

REFERENCES