

# DH2413 2022 Advanced Graphics and Interaction Course Analysis

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## Description of the course analysis process

The course instructor and examiner, Mario Romero, together with course assistants, Alessandro Iop, Marko Petrovic, Ingemar Markström and Björn Thuresson, analyzed the results of the course evaluation. They synthesized the main topics and included them in this report.

## Changes introduced in 2022 (from 2021)

1. Changed from 2021, given that the COVID19 pandemic was officially declared over, we no longer took extra precautions to limit possible infections.
2. We removed zoom from the regular lectures. Only when the instructor was ill did we have the instructor communicate through zoom.
3. We re-introduced both ForskarFredag (end of September) and Tekniska Museet (beginning of November) presentations.
4. We re-introduced a theme to the second project. The theme was a view for the audience into virtual worlds with a third-person but interactive perspective.
5. We introduced stricter guidelines for managing equipment and posters through online tables where the students are responsible.
6. We introduced sponsors (rather than industrial partners). The difference is that the sponsors make offers but the students are free to simply be inspired by the offers. The students can still work on their own ideas and the sponsors can choose groups to support through meeting and feedback. Adria Cruz, in particular, is an excellent sponsor.
7. We have started formally using room D4449 (Akvariet) for development and demos. This is working well.
8. We formally reserved room 4448 and it worked well for the Open House.
9. Formally evaluate a presentation for MultiModal students DT2140 - first week of November.

## Proposed changes towards 2023

1. We will increase opportunities for peer review and feedback.
  - a. Pairwise presentations during agile meetings.
2. Peer review the project final deliverables on the websites.
3. We will diversify opportunities to present projects without grading.
  - a. Make it explicit that every agile is an opportunity to present work without grading.
4. Stop using Google Docs. Start using Canvas for structured individual learning journals with support from OneDrive or Canvas cloud storage to upload images and videos. Our goal is to make this process more efficient and effective for students and teaching assistants. Also, it is legally protected by KTH.

5. In Canvas, we add a *page* with equipment and people tables and other planning documents that the students can edit. We will work on a solution that is technically practical and reusable.
6. Write an ethical protocol that includes signed consent to use the journals for research purposes with Olga Viberg. Prof. Viberg will write this.
7. Recommendation from the students: shared resources pages (among all students?) with links to relevant tutorials, documentation, videos, and other digital assets.
8. Review the point system to formally include delivery of working code to the Visualization Studio. See Table 1.
9. Change in **Ladok** by asking Monika Lundell. Period 1: 5 HP. Period 2: 4 HP. Evaluated elements: Project 1 - P/F - 3 HP, Project 2 - P/F 2.5HP, Individual Evaluation, Grade A-F, 3.5 HP - runs over both periods. The course remains letter grade. (First email sent on February 1, 2023).
- 10. Ask GRU for budget to rent vehicles for Forskarfredag and Tekniska Museet. Talk to Chris and Jarmo. Avoid driving ourselves.**
11. Increase engagement in the course evaluation in the future. In 2022 we have 12 respondents of 41 students. Previous engagements:
  - a. 2022 - 12/41
  - b. 2021 - 8/37
  - c. 2020 - 12/47
  - d. 2019 - No course evaluation
  - e. 2018 - No course evaluation
  - f. 2017 - 13/44
  - g. 2016 - 34/59
  - h. 2015 - 26/27
12. Add a question to the survey about group workload distribution and balance with suggestions for improvement from the students that have critical feedback.
13. Perhaps we include in the discussion for forming groups to reflect on the level of ambition per student. We could be more explicit.
14. We will add more detailed information about the course structure, examination, ILOs and grading criteria in the KTH social page for the course, which is where students can find information about it before registering on Ladok.
15. We will resize the importance of the Website design for both projects, without compromising on the quality of the content (see Table 1 below).
16. We will provide a more detailed and consistent definition for what qualifies as “advanced” in terms of graphics and interaction, so as to enable a better alignment of students’ expectations and ambitions. This will help address miscommunication among team members and aid the definition of each project’s branches. This information will be provided at the beginning of the course.
17. We will give a thorough and clear presentation of the content and purpose of the learning journal, early on in the course. In other words, we will clarify what the journal is for, what the faculty expects to read in it, how it will be graded and how it should help students throughout the course. Particular emphasis will be given to the SRL processes that motivate the journal structure. This may yield better quality journal entries, as well as more frequent and regular updates in the journal, thus ultimately improving the student’s learning experience (especially through reflections).
18. We are proposing a new points scheme:

a. Table 1:

	Description	Points
<b>1.</b>	<b>Project 1</b>	<b>35</b>
1.1.	Proposals (1 point for forming groups)	5
1.2.	Hello World Demos	5
1.3.	ForskarFredag	5
1.4.	Tekniska Museet	5
1.5.	Multimodal Interaction and Interfaces DT2140	5
1.6.	Open House	5
1.7.	Webpage report of Project 1	5
<b>2.</b>	<b>Project 2</b>	<b>25</b>
2.1.	Proposals	5
2.2.	Hello World Demos	5
2.3.	Dress Rehearsal	5
2.4.	Open House	5
2.5.	Webpage report of Project 2	5
<b>3.</b>	<b>Individual Assignments</b>	<b>40</b>
3.1.	Six entries in Individual Learning Journal	30
3.2.	Five past project analyses	10
<b>4.</b>	<b>Extra Credit</b>	<b>10</b>
4.1.	Handover Project 1 to VIC	5
4.2.	Handover Project 2 to VIC	5

## Comparing results in the course evaluation to previous years

The main difference with the two previous years is that the pandemic was declared over by the government. We held all the meetings, demos, and presentations from the period before the pandemic. This increases the work for the staff. The details of the course evaluation are below.

## Analysis of the course evaluation with planned developments for the next round of the course

### Estimated Workload Analysis

The course is a 9HP course. Using 27 hours of work per credit, that amounts to 243 hours of work which, distributed over 17 weeks from week 35 to week 2, 2022, gives approximately **14 hours** of work per week. Students reported working 17 hours per week. Statements from students, verbatim:

- Comments (I worked: 12-14 timmar/vecka)
  - The amount of time I spent varied greatly between the days and weeks, but that was due to my own poor planning skills.
  - As the teachers said, it is not about the hours but rather the fact that you are working on something you are really passionate about.
- (I worked: 18-20 timmar/vecka)
  - The amount of work does not really represent the amount of credits of this course. I enjoyed working on the projects, so I spent more time on it, but it would be great if the course would have a bit more credits to account for that.

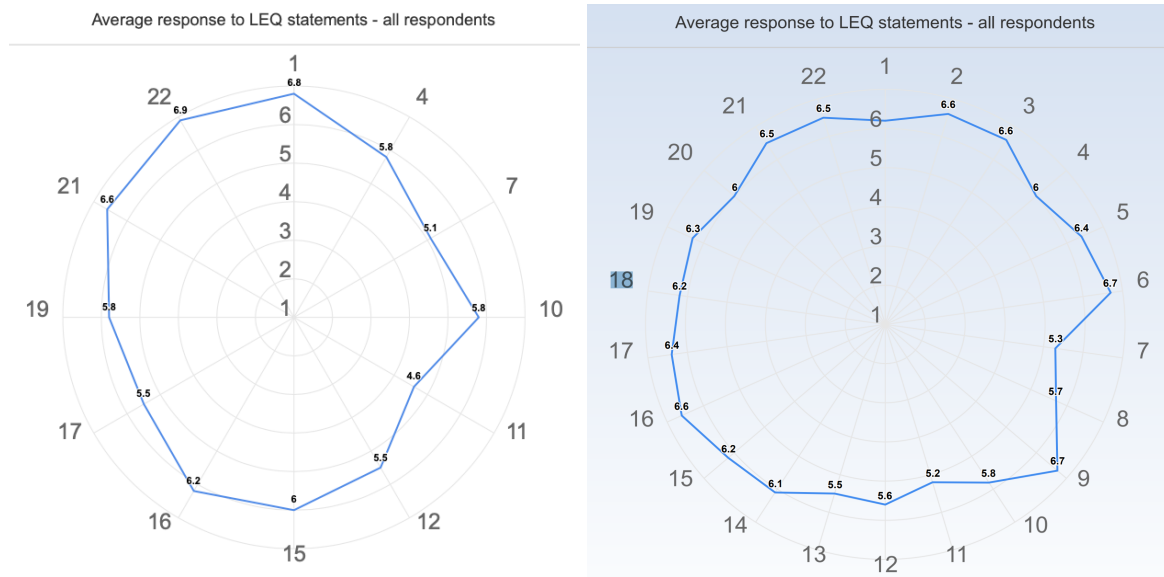
- This felt like too much work during the first period. This is due to the course being advertised as 3 hp during that time, which does not reflect the workload. For the second period it was more manageable, however, in total it felt more like a 15 point course than a 9 point one.
- All in all I [think] I spent a reasonable amount of time on the course, but it mostly consists of crunch periods and periods of rest, to an unhealthy degree. Worst of all are the various shows you must participate in. I think a more formal system for signing group members up to different time-slots could solve that though, making sure to reduce the number of active hours for each member below 4.
- (I worked: 24-26 timmar/vecka)
  - Most time work together with my teammates.
- (I worked: 33-35 timmar/vecka)
  - The workload is high but it is worth investing the time to learn. Especially since we could decide by ourselves where to invest our time into.
- (I worked: > 41 timmar/vecka)
  - I spend much more time on the first period on the course since I have much less time during the second period due to other courses

#### Analysis of comments of estimated workload

It is important to highlight that people reporting high workloads have positive comments about it. The main complaint is the uneven workload. The two aspects that we plan to address are the distribution of credits between periods. That is, we aim at loading the first period more than the second, contrary to what is in Ladok. The second comment is about the balance of the workload across time. People complain of the vast variation between periods of active work and just no work. How do we balance that? **We should add a question to the survey about the balance of workload in the group.**

#### Learning Experience Survey

All these statements do not include formal statistical analysis. We ran the LEQ survey with 22 questions. In 2021, we ran it with 10 questions. All the LEQ survey statements were above 5.0. This is better than last year. All average entries are positive. The six statements we will focus on to analyze are 7, 8, 10, 11, 12 and 13, which received the lowest scores, between 5.2 and 5.8. We are focusing on all the questions with a score below 6.



**Figure 1.** Left - 2021. Right - 2022. Key questions to focus are the scores below 6.

### Statement 7:

“The intended learning outcomes helped me to understand what I was expected to achieve”. The ILOs are very generic and abstract. The reason for this generic description is to allow for freedom and flexibility. The students need to choose their specific learning outcomes. Furthermore, given the rate of progress in computer graphics it would be detrimental to include specific ILOs for concrete tools and methods. For example, asking them to learn Unreal or Unity explicitly may hinder including newly developed tools in the future. We need to emphasize that it is in the Individual Learning Journal that they have the opportunity and responsibility to be as specific as they need or want to be. Suggestion: include a question in the survey about the individual ILOs posed in the same manner as Q7.

### Statement 8

“The course was organized in a way that supported my learning.” Many of the proposed changes for the coming years address this statement. We aim to re-balance the accreditation between periods 1 and 2 and we also aim to be even more transparent about the chronological workload of the course.

**Comments** (My response was: -3) - I gained experience for sure, but I learned next to nothing.

From the first comment, we need to be explicit about this. If people are not learning, they are not using the opportunities we have given them. They can and should take risks in their individual contributions, even if these do not work. People who stay in their comfort zone are not doing what they are asked to do. This should be reflected in the evaluation: no individual contributions taking risks, no grade for that. We need to make this entry to the journal explicit. The journals need an explicit section about individual contributions.

**Comment** (My response was: +2) - I learned a lot from this course, but most of the learning was done by myself.

This is THE goal.

## Statement 10

“I was able to learn from concrete examples that I could relate to.” We show past projects, but interacting with them is too superficial for learning how to create them. We do not have the scaffolding to motivate current students to interview past students. Should we have this? We could invite previous years’ students to hold a panel discussion as one of the group forming activities. We could also create a documented repository from which future students gain knowledge. Finally, we should point them to places where they can pose questions and find quick answers, for example Stack Overflow.

## Statement 11

“Understanding of key concepts had priority”. One of the challenges of teaching a course that requires significant hands-on interaction from both the students who are developing the project and guests who are participating as users testing and providing informal feedback to the projects is that the number of activities that need to happen in order to coordinate this event is very high. The effect of this complexity is that some of the key concepts are washed out. We need to adapt the activities that the students perform and focus them on the key concepts that they need to reinforce.

## Statement 12

“The course activities helped me to achieve the intended learning outcomes efficiently.”

**Comment** (My response was: -3) “This is my biggest issue. I spent the course wrestling with bugs and team coordination, not "advanced graphics and interaction".”

A quote from industry: “Please keep the number of critical bugs below 100 and pray that the engine starts.”

Ale: we need to reinforce the reality of needing to change directions. Have a plan B.

Björn: we need to have a group challenge explicitly stated in the ILOs... oh we do!

## Statement 13

“I understood what I was expected to learn in order to obtain a certain grade .”

**Comments** (My response was: -3) “was seemingly disconnected to the course in all but a superficial manner.”

## What was the best aspect of the course?

To the general question “what was the best aspect of the course?”, we received a number of replies. Here are all responses, unedited other than spelling and punctuation:

- (I worked: 6-8 timmar/vecka)
  - The degree of freedom of choice that the groups had in terms of what they wanted to do.
- (I worked: 12-14 timmar/vecka)
  - Getting to use cool technology in a cool and creative setting.
  - The projects and the group spirit. Both as a group for the project and as a group of the whole course.
- (I worked: 18-20 timmar/vecka)
  - the projects :)
  - The general atmosphere and structure of the course.
  - I had fun, as much as I dislike the format and the rules, at the end of the day, it was an unforgettable experience. Even my bitter heart can't deny that.
- (I worked: 24-26 timmar/vecka)
  - Work on interesting topics.
  - Working in a group toward a meaningful deadline/exhibition.
- (I worked: 27-29 timmar/vecka)
  - I quite enjoyed the freedom and the options to explore our own ideas and interests.
- (I worked: 33-35 timmar/vecka)
  - That we were invited to concentrate on our own learning objectives. This, combined with group projects to make sure that we could contribute with these objectives to a complete project (great for the portfolio). Also, the regular feedback sessions were super helpful!
- (I worked: > 41 timmar/vecka)
  - You can [basically] learn anything you want.

## What would you suggest to improve?

For the question “What would you suggest to improve?”, we have a number of answers which we synthesize below.

The text below paraphrases the comments from the students.

- (I worked: 6-8 timmar/vecka)
  - I personally struggled finding a group in the beginning, and ultimately only got into one because I lucked out somewhat. Some improvements could likely be improved there, as I could imagine people with greater levels of social anxiety might really struggle with it otherwise.
- (I worked: 12-14 timmar/vecka)
  - Perhaps, on the project websites, it would be useful if the groups would leave behind tips for stud btw who plan to make something similar. For example, how to get the pixel sense input to unity.

- I wish there was more upfront information about the course structure. The information of the course structure once I got access to the canvas page was immaculate. However, I had no clue how the course was structured when I was deciding if I should take it or not. Particularly the fact that the HP point distribution on the course page is incorrect to a degree. And the fact that even though it says we have an examination, we don't really have an examination in the usual way. This wasn't a problem for me, but I know at least 1 person that didn't join this course for the sole fact that the course page said it had an examination.
- (I worked: 18-20 timmar/vecka)
  - I preferred how the second project was handled. For the first project I felt we spent a lot of time on discussions during the lectures, which might have not been that useful. Also I don't think the websites should be that important to the course, as it is not a web programming course.
  - As mentioned in the workload section, the amount of time spent on the course should be reorganized or setup better. The points per period should at least be balanced more properly (though this might not be something that can be done by the course examiner). Also, mention clearly what the final experience of your project should be for people when presenting. I.e. a couple of minutes experience that has a clear end to make presenting smoother.
  - Too much of the course is spent setting up basic gameplay. Give the groups a base to work from, either something generic, or the work of the previous year's groups. Then challenge them to improve it with different advanced concepts, and make them prove they have done so (or at least attempted). I love games, but gameplay should be secondary and that must be made clear.
- (I worked: 24-26 timmar/vecka)
  - The selected topic for the second project is not well developed. Mario spent lots of time explaining the effect he wanted.
  - Would have liked to see individual help on figuring out what kind of 'advanced graphics/interaction' one could implement, aiming for a higher grade. It is also hard to find a trade-off between contributing to the success of the project and spending time on one's individual 'advanced topic'. Meaning some in the group may have to spend more of their time on general project work and "sacrifice" their grade because others want to work their small advanced individual topic. Just saying some direct guidance around this would be helpful for people.
- (I worked: 27-29 timmar/vecka)
  - Probably the course page, since it currently doesn't really explain what the course is about and makes it sound like a very different course, both from a content and educational perspective
- (I worked: > 41 timmar/vecka)
  - maybe have a list of area you can explore if you are interested?

## What advice would you like to give to future participants?

For the question "What advice would you like to give to future participants?", we list all the answers as we find all them valuable.



- (I worked: 6-8 timmar/vecka)
  - Don't try to cram everything in at the end. Although you're definitely going to do it anyway, so anything done before that can help a lot.
- (I worked: 12-14 timmar/vecka)
  - Prioritize an original idea over a complicated idea for a project.
  - Do only what you want to focus on. Don't make a project that will require you to do things that you have no interest in or is not within the scope of the course. Especially do not do such things when you are unsure how much time or effort it will take. It is fine if it is something you are interested in and is relevant for the course.
- (I worked: 18-20 timmar/vecka)
  - Select a project manager and plan ahead.
  - Do not focus too much on the things that are not part of the course. I.e. focus on the graphics and interaction, and not e.g. game design or something of that nature.
  - Don't aim too high, think of something really generic and simple and then get to work on "advanced graphics and interaction".
- (I worked: 24-26 timmar/vecka)
  - Do the reflection regularly.
  - Aim high, disregard what you perceive as obstacles and try things until your testing shows it doesn't work.
- (I worked: 27-29 timmar/vecka)
  - Don't really stress, and just explore what you think seems interesting. This is a hands on opportunity to learn about something you care about.
- (I worked: 33-35 timmar/vecka)
  - Try to build groups based on your interests and make sure that everyone can work on different parts of the project with different skill sets.
- (I worked: > 41 timmar/vecka)
  - Take note of what you want to write in the journal when you are doing it and the date. I know you won't have time to write the journal near the deadline, but it's good to know what you plan to write so you don't forget it later.

Is there anything else you would like to add?

Finally, to the question "is there anything else you would like to add?" We included some representative replies and also those that we found particularly encouraging.

- (I worked: 12-14 timmar/vecka)
  - This was a wonderful course! I learned a lot and had so much fun.
  - This has to be one of the best courses I have ever taken and will ever take.
- (I worked: 18-20 timmar/vecka)
  - Sorry for being so mean, but I'm really torn. This course was a great opportunity, but I feel like I wasted it due to my own desire for at least functional gameplay. You need to stop that instinct, especially if you insist on having us make two projects.
- (I worked: 24-26 timmar/vecka)

- One of the best courses of my student career. Every teacher at VIC has been very helpful! <3
- (I worked: 27-29 timmar/vecka)
  - Nope



Figure 2. AGI22 Open House

## Conclusion

Figure 2 shows a mosaic of experiences at the AGI22 Open House in the visualization studio. Our goal with this course evaluation is not to change that atmosphere. We want to nurture and sustain it. Our goal is for the process of getting there to be more rewarding and that the focus of the time spent developing the projects is on the core content. We aim to eliminate the bureaucratic or technical distractions that take away from time spent on learning goals. We look forward to AGI23!