Final assignment

The course is 6 cr, which means that there needs to be some extra exercise besides attending the lectures.

Deadline: 1st March 2023. Return your work using MyCourses.

There are multiple options for the assignment, explained below.

Option 1: Read a book and submit a learning diary

Read one of the books recommended on the intro lecture. Pick one that you haven't read already. I especially recommend Game Balance, as it is the most recent one. Submit your learning diary through MyCourses. Learning diary formats vary, but the minimum is that you should report what were the most important lessons for you in each chapter, and why (if applicable). This will be useful for me in developing the course further, as I will better understand where the students are coming from and what they find important.

Option 2: Short literature survey of a research topic or question

Think of an interesting design or research question and conduct a brief literature survey about it, using peer-reviewed academic sources. Think of this as the equivalent of an Aalto SCI bachelor's thesis, but shorter (5-10 pages). Good examples of such theses (passed with distinction): https://aaltodoc.aalto.fi/handle/123456789/24416, https://aaltodoc.aalto.fi/handle/123456789/44587, https://aaltodoc.aalto.fi/handle/123456789/108067

Ideally, this should be something that could ultimately become the "background and related work" chapter of your Master's thesis.

Grading is based on clarity of writing and argumentation. For grade 5, you should also be (semi-)systematic in your literature searches and explain your search process similar to the B.Sc. theses by Olli Pasanen and Emil Lindfors (above). Before doing the work, check how Lindfors explains and documents his process. Remember to include a table of search terms and results.

Option 3: Colab analysis of an existing game

Extend the course's Clash Royale notebook by implementing the advanced exercises at the end, and reflecting on whether your results make sense. Completing one advanced exercise gives you grade 3, two give 4, and completing all 3 gives a 5.

Alternatively, you can analyze a different game. The grading will depend on how well you explain and visualize what you do and how challenging the task is. Don't assume that the person determining the grade knows the game you're analyzing. Because of this, it's good to include a link to an explanatory gameplay video.

If you analyze a different game, consider what kinds of data you could obtain and analyze. For example, this paper uses interesting data of puzzle game difficulty progression: https://cora.ucc.ie/bitstream/handle/10468/3461/Learning_Curves_AV.pdf. The authors basically logged the number of steps needed to solve each puzzle in four successful puzzle games, which allows plotting a rough estimate of how puzzle complexity evolves as the games progress.

Option 4: Emotional game prototype

Extend one of the exercises at the end of the "Psychology of games part 3: Emotion" lecture.

The goal is to actually implement your game concept (or a new concept you come up with) and reflect on whether it actually manages to elicit the emotions you went for. For the best grade, you should playtest and ask your players to describe the emotions the game evokes.

Option 5: Research game prototype

Create a game prototype that investigates some research question. The game should be playable in a browser so that you can easily recruit people to try it out and give you data. Use the study design most common in empirical game research, explained below. Before implementing anything, check your plan with perttu.hamalainen@aalto.fi)

If you do this assignment well, it could ultimately be extended to become as master's thesis project and a published research paper. Having a published paper will help you in getting to a PhD program or in applying for research or art grants.

Do the following (Google the terms that you are not familiar with, and as Perttu if not sure about something).

- Create 2 or more versions of the game to compare. For instance, one could be some "standard" or baseline version of a game mechanic, and the other could be a new version you come up with. The game version will be your independent variable (IV), which you manipulate to investigate its effect of user behavior and experience
- Think of a reasonable hypothesis of how the IV affects user behavior and experience. For instance, you could hypothesize that your novel mechanic (or other invention) improves the psychological need satisfaction. The affected experience and/or behavior variables are your dependent variables (DV:s).
- Think of how to test your hypothesis. To measure need satisfaction, you could utilize Player eXperience Inventory (https://www.playerexperienceinventory.org/). Other common DV:s are task completion time and/or success rate (e.g., of solving a game puzzle or level).
- Run your experiment as a within-subjects experiment, i.e., for each user, present the game versions or so called "experimental conditions" in a random order. This is in contrast to between-subjects studies where every user experiences only a single game version. Within-subjects is more common as the individual differences of users cause less noise in the statistical analysis. and collect DV data for each version, e.g., using the PXI questionnaire. You can log the data, e.g., using Unity Analytics or by connecting to a spreadsheet through Google Sheets API. The randomization is important to disentangle the effect of your IV and the ordering of the game versions on your DV:s.
- Analyze your data and generate boxplots of your DV:s for each game version.
- Also plot histograms of your DV:s to determine whether they are normally distributed.
- Conduct a statistical test using Python or R to analyze whether there are statistically significant differences between the game versions. Note that to do this reliably for a real research paper, you should have data from at least 30 players, but you can complete this exercise with less. If your data can be considered normally distributed (e.g., looking at the histograms) you should conduct a repeated measures ANOVA. The repeated measures is the version that works for the within-subjects study design.. If your data is not normally distributed, a common test is the Friedman test.
- If the test above indicated a significant difference (conventionally, this is considered to be the case with $p<0.05$), and if you have more than 2 game versions, conduct so-called post hoc tests to investigate which pairs of game versions differ. Remember to use Bonferroni correction to avoid random false positive results, i.e., multiply the post-hoc test p-values with the number of post-hoc

test you conduct. If you used ANOVA above, use t-tests for the post-hoc analysis. If you used Friedman, use Nemenyi post-hoc tests.
- Compile and submit a brief PDF report describing your implementation of the above, including the box plots, histograms, and the statistical testing results. In reporting, follow this guide: https://psych.uw.edu/storage/writing_center/stats.pdf

This is quite a challenging and labour-intensive task, and you'll get a grade 5 if you perform the above without methodological errors and your tested hypothesis is reasonable. Whether you found a statistically significant result is irrelevant; the main thing to practice here is the empirical game research process.

Option 6: Essay

Write an essay of 2500-5000 words, utilizing any of the concepts and tools introduced during the course. For example, you could analyze a game's design from the point of view of need satisfaction or emotional gratification.

The essay structure should be something like:

Abstract
- Summarize your approach and conclusions in less than 200 words.

Introduction
- What game you are analyzing
- What questions are you trying to answer or what point of view or approach are you using? (e.g., "The goal of this essay is to identify and analyze behavioral game design patterns in the game X")
- Why do the questions matter? E.g., why did you choose this game and what makes it interesting from this point of view? (e.g., the game might be one of the top grossing free-to-play games, or a sequel that did considerably better/worse than the original game and you want to understand why)

Content chapters

Conclusion
- Highlight the key takeaways and lessons learned

References
- You can cite my lecture materials, but for the best grade you should read and use the original articles (e.g., [Hunicke et al. 2004; Ryan et al. 2006]). The lecture slides should have the links to the papers – let me know if you cannot find something. Note that to download some papers for free, you might need to be in Aalto intranet or in Aalto Wifi (Note: Aalto Open doesn't give you access to scientific libraries).
- Use and format the references consistently. The easiest way to do this is to cite using [Author Year] in the text. To compile the reference list, use Google Scholar to find the paper, click on the "cite" link, and then copy&paste the citation info in APA format in alphabetical order (see below for example). You can of course also use Latex&Bibtex or a reference management system such as Zotero.

Hunicke, R., LeBlanc, M., & Zubek, R. (2004, July). MDA: A formal approach to game design and game research. In Proceedings of the AAAI Workshop on Challenges in Game AI (Vol. 4, No. 1).

Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. Motivation and emotion, 30(4), 344-360.

For more essay writing tips, this presentation has good points:

https://www.slideshare.net/Ty171/essay-structurepptx

Note especially the TEEL paragraph structure (slide 12). Many students make the mistake of writing paragraphs that omit the "L", i.e., the text does not flow logically from paragraph to paragraph.

The essays will be primarily graded based on the clarity of language and argumentation – make your points clearly and concisely using well-selected examples, and try to have the text flow logically from intro to conclusion. In practice, the default grade for everyone is 3, and I will then adjust it upwards for those essays that stand out, or downwards if you make clear mistakes or haven't put effort in polishing the text (i.e., there are many spelling or grammar errors).