Final assignment

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

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

There are multiple options for the assignment, explained below.

Option 1: Game poem

Make a small game or game poem that explores a theme or themes discussed on the course, e.g., how to elicit a particular emotion.

For example, you could make and experiment on emergence inspired by the 50 Things That Made the Modern Economy podcast: https://www.bbc.co.uk/programmes/p04b1g3c/episodes/downloads

Alternatively, you could 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 collect feedback from your players

Option 2: Read a book and submit a learning diary

Read one of the books recommended in 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 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: 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 5: Research game prototype

This is the most challenging option, but can also be the most rewarding one. Only recommended for those with a passion for research and discovery, a lot of time to invest, and possibly plans to do a PhD after the Master's degree.

You should create a game prototype that investigates some research question. Use one of the study designs 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 a 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.

Note that for the data collection, you will also need to obtain the players' informed consent. Perttu can provide you a form for that.

Qualitative game research experiment:
Example paper: Kontio, Reetu, et al. ""I Feel My Abs": Exploring Non-standing VR Locomotion." *Proceedings of the ACM on Human-Computer Interaction* 7. CHI PLAY (2023): 1282-1307.

Similar to the example paper, do the following (Google the terms that you are not familiar with, and as Perttu if not sure about something).

- Create your experimental game that explores something new
- Test it with players, collecting data such as think aloud voice recordings (that you will then transcribe into text) and end-of-game interview or questionnaire
- Do a thematic analysis of the data, to investigate your research question. If you invented a new mechanic or interaction, the question can simply be what opportunities and challenges it provides for game design, and how the mechanic or prototype should be improved in the future. Of course, you should have some idea of the opportunities to motivate the work even before you start. A good exercise is to try to answer the 5 evaluation questions at the end of the intro lecture, before you implement your game and collect your data.

Quantitative game research experiment:
Example paper: Evin, Inan, et al. "3pp-r: Enabling natural movement in 3rd person virtual reality."
Proceedings of the annual symposium on computer-human interaction in play (CHI PLAY), 2020.

Similar to the example paper, 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.