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# DESE61008

## Project: Cournot and Stackelberg games

### Coursework grading scheme

The approach to the assessment relies on the following blocks:

- **Game description** – 10%
- **Cournot game analysis** – 10%
- **Stackelberg game analysis** – 10%
- **Solution/Outcome discussion** – 10%
- **Coding, visualisation and discussion** – 15%
- **Extensions** – 20%
- **Games in the real-world** – 15%
- **Quality of the report** – 10%

In parallel, if in groups of 2, the students are required to provide a clear split of their contributions to the various components of the project, towards the individualisation of their grade. The table should look like:

	Student 1	Student 2
Game description	$X_1$ %	$100 - X_1$ %
Cournot game analysis	$X_2$ %	$100 - X_2$ %
Stackelberg game analysis	$X_3$ %	$100 - X_3$ %
Solution/Outcome discussion	$X_4$ %	$100 - X_4$ %
Coding, visualisation and discussion	$X_5$ %	$100 - X_5$ %
Extensions	$X_6$ %	$100 - X_6$ %
Games in the real-world	$X_7$ %	$100 - X_7$ %
Quality of the report	$X_8$ %	$100 - X_8$ %

Note that when submitting the report with this table, it necessarily implies that this is the consensus reached by the students on their contributions. If the students do not manage to reach a consensus, they need to inform the lead instructor **before** to submit their report.

For the various assessment blocks, a grade between 1 (Poor) and 10 (Excellent) will be given. The overall grade will sum to 100 (using the weighting given in the above). In principle, a minimum pass corresponds to a 40. For this module though, it is the overall grade that counts. It means that the weighted average between coursework submission and written exam has to be above 40, while the minimum pass requirement will not be applied to each assessment/exam individually.

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Grading of the coursework submission is based on the following principles:

**Game description (10%):**

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Poor:	The presentation of the game does not follow the mathematical formalism used throughout the module. Terminology is used wrongly. Concepts are not introduced well.
Minimum Pass:	The report only gives the basic equations, without giving a clear idea of all aspects involved.
Excellent:	All aspects of the game are covered in a very thorough manner, making it clear that the student(s) masters the terminology, mathematical concepts and formalism, etc. within game theory. In addition, the presentation makes a clear connection between the two types of game being covered by the coursework.

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**Cournot game analysis (10%)**

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Poor:	There is a clear lack of understanding of how to analyse a game and of how to derive useful insights.
Minimum Pass:	The report quickly gives a set of results that are providing minimal insight(s) on what is going on with such games.
Excellent:	The work gives an extensive overview of all potential solution concepts, analysis of insights, connection between the games, etc. The presentation of the work and results gives confidence that the student(s) masters the underlying concepts and relevant mathematics involved.

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**Stackelberg game analysis (10%)**

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Poor:	There is a clear lack of understanding of how to analyse a game and of how to derive useful insights.
Minimum Pass:	The report quickly gives a set of results that are providing minimal insight(s) on what is going on with such games.
Excellent:	The work gives an extensive overview of all potential solution concepts, analysis of insights, connection between the games, etc. The presentation of the work and results gives confidence that the student(s) masters the underlying concepts and relevant mathematics involved.

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**Solution/Outcome discussion (10%)**

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Poor:	There is a clear lack of understanding of the solution and outcome of both games.
Minimum Pass:	The report only covers basic facts about the solution and outcome of the games, as well as the connection between Cournot and Stackelberg games.
Excellent:	The work gives an extensive description of the solution and outcomes, while providing a well-grounded discussion of the connection between Cournot and Stackelberg games. The presentation of the work gives confidence that the student(s) has developed an advanced understanding of the solution concepts involved, of the specifics of these games, and of the analysis aspects to be considered.

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### Coding, visualisation and discussion (15%)

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Poor:	There is no evidence of the capability of the students to produce code that would allow to analyse the games. Plots barely show a simplistic example and do not support the advanced discussion expected when having to look for extensions.
Minimum Pass:	There is evidence of the use of code to produce example and results. However, the use of coding stays at a simple level to merely go beyond simple examples for the games involved. Very limited insights are produced for the extensions to be considered. Visualisations are poorly chosen.
Excellent:	The code produced allows to provide a broad range of insights about the games and their extensions. Visualisations are very well-chosen and their choice motivated. The insights derived are therefore very clear and perfectly support the discussion. The discussion brings forward advanced insights about the games in a way that is explained clearly.

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### Extensions (20%)

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Poor:	The extensions chosen are straightforward and bring very little novel insights about these games. They are not well analysed. The material produced (mathematical analysis, simulations, visualisations, etc.) do not adequately support the derived insights.
Minimum Pass:	The extensions give a new perspective on these games, but yield very limited insights. The use of mathematics, code, and analysis elements is limited. Still, there is evidence that the student(s) could go beyond the most simple version of the games only.
Excellent:	The extensions are very well chosen and motivated. They give advanced and interesting insights about the games individually, and/or in connection to each other. The work gives confidence that the student(s) has aimed to go above and beyond, in order to understand the state of the art when it comes to the types of games at hand, and their connection. Code, mathematics and simulations/visualisations support the insights extremely well.

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### Games in the real-world (15%)

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Poor:	The real-world inspiration is on par with text book examples, with a limited understanding of the connection between these real-world examples and the formal analysis performed in the work.
Minimum Pass:	The student(s) recognises some interesting real-world application, and is able to formulate basic statements about what the analysis as taught us about what we should expect to see in the real-world version of these games.
Excellent:	The work provides evidence of maturity (with the material covered within the module), by giving a clear connection to advanced real-world instances of these games. The student(s) is able to formulate advanced insights about what we expect to see in the real-world, based on mathematical analysis and simulations, but also based on the broader understanding (and critical analysis) of the assumptions involved, simplifications, etc.

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### Quality of the report (10%)

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Poor:	The quality of the text is not very good, the report is poorly structured and does not meet the expectations.
Minimum Pass:	The information is there, though the flow of information could be rethought, and the quality of the report (English used, terminology, presentation) could be improved.
Excellent:	Excellent report, which is both very clear and well presented. The writing gives confidence that the student(s) masters the terminology and concepts learned within game theory. Such a report could easily be turned into a short paper.

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