

Methodology

Before each session, you will have to study on videos or documents (or on a textbook, mostly *Essential Mathematics for Economic Analysis*, Knut Sydsaeter, Peter Hammond, Arne Strom, Andrés Carvajal; Pearson editions - 5th or 6th edition), and to do the exercises related to that video / textbook chapter. The solutions of the exercises will be available online. The workload of this online preparation is estimated between 4 and 5 hours before each live (in-class) session.

It is very important that you keep track of every mistake you make during that preparation, because the formative assessment (55% of your final mark) will be an error analysis report.

This formative assessment will consist in a group analysis of the students' mistakes: why did that student make that mistake? Which notions were misunderstood? Why? How can this confusion impact the rest of the student's learning process?

During the live sessions, a multiple choice questions test will be given to you, so you can check if all the notions are well understood. Once again, if you make any mistakes during that test, keep track of them. This test is intended to help you ask questions to the teachers in order to increase your knowledge, but of course you should come to class with all the questions you need to ask in order to master the topics studied that week.

Session 1: Sets of numbers, basic notions of logic, contrapositive of a conditional statement. Sequences: notation, proof by induction.

1.1 Sets, sets of numbers

Estimated workload: **30 minutes**

Bibliographic reference: Essential Mathematics for Economic Analysis, Knut Sydsaeter, Peter Hammond, Arne Strom, Andrés Carvajal; Pearson editions (5th or 6th edition). **Chapter 1, Paragraph 1.1**

1. Video: TSM01 Sets: <https://www.youtube.com/watch?v=-Dd7u0KAqZQ>
2. Exercise: Exercise 1.1
Exercise sheet here: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Exercises.pdf
3. Solution: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Solutions.pdf

1.2 An introduction to logic

Estimated workload: **2 hours**

Bibliographic reference: Essential Mathematics for Economic Analysis, Knut Sydsaeter, Peter Hammond, Arne Strom, Andrés Carvajal; Pearson editions (5th or 6th edition). **Chapter 1, Paragraph 1.2**

1. Video: TSM02 Logic: <https://www.youtube.com/watch?v=f5wtJne7l1o>
2. Lesson: TSM01 Formal logic lesson: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Formal_logic_lesson.pdf
3. Exercise: TSM Logic exercises; exercise sheet here: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Logic_exercises.pdf
4. Solution: Video - TSM03 logic exercises solution: <https://www.youtube.com/watch?v=TyPItP1QMAM>
5. Video: TSM04 Negation: <https://www.youtube.com/watch?v=5ms0DJlz7yk>
6. Exercise: Exercise 1.2, 1st part.
Exercise sheet here: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Exercises.pdf
7. Solution: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Solutions.pdf
8. Video: TSM05 Contrapositive: https://www.youtube.com/watch?v=YK-9quGZ_Fw
9. Exercise: Exercise 1.2, 2nd part.
Exercise sheet here: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Exercises.pdf
10. Solution: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Solutions.pdf

1.3 Sequences: notations, proof by induction

Estimated workload: **90 minutes**

Bibliographic reference: Essential Mathematics for Economic Analysis, Knut Sydsaeter, Peter Hammond, Arne Strom, Andrés Carvajal; Pearson editions (5th or 6th edition). **Chapter 1, Paragraphs 1.3 and 1.4**

1. Video: TSM06 Sequences notations: <https://www.youtube.com/watch?v=hQRnYJSoaFM>
2. Exercise: Exercise 1.3, 1st part.
Exercise sheet here: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Exercises.pdf
3. Solution: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Solutions.pdf
4. Video: TSM07 Induction: https://www.youtube.com/watch?v=sk2v9_qZh7M
5. Exercise: Exercise 1.3, 2nd part.
Exercise sheet here: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Exercises.pdf
6. Solution: http://maths.langella.free.fr/TSM/Sequence_01/TSM01_Solutions.pdf

Session 2: Sets of numbers, basic notions of logic, contrapositive of a conditional statement. Sequences: notation, proof by induction.

2.4 Arithmetic sequences

Estimated workload: **30 minutes, 2 hours** if you start from scratch and didn't study this in high school

Bibliographic reference: Any A-level textbook, or 1st undergraduate math book.

1. Video: https://youtu.be/_aw01dMqXJg
2. Exercises: http://maths.langella.free.fr/TSM/Sequence_02/TSM02_Exercises.pdf
3. Solutions: http://maths.langella.free.fr/TSM/Sequence_02/TSM02_Solutions.pdf

2.5 Geometric sequences

Estimated workload: **1 hour, 2.5 hours if you start from scratch and didn't study this in high school**

Bibliographic reference: Any A-level textbook, or 1st undergraduate math book, and Essential Mathematics for Economic Analysis, Knut Sydsaeter, Peter Hammond, Arne Strom, Andrés Carvajal; Pearson editions (5th or 6th edition). **Chapter 10, Paragraph 10.4**

1. Video: <https://youtu.be/hJiGu8b0qAM>
2. Exercises: http://maths.langella.free.fr/TSM/Sequence_02/TSM02_Exercises.pdf
3. Solutions: http://maths.langella.free.fr/TSM/Sequence_02/TSM02_Solutions.pdf

2.6 Sequences abstract

Sequences abstract: http://maths.langella.free.fr/TSM/Sequence_02/TSM02_Sequences_abstract.pdf

2.7 Summation operator: Sigma notation

Estimated workload: **90 minutes**

Bibliographic reference: Essential Mathematics for Economic Analysis, Knut Sydsaeter, Peter Hammond, Arne Strom, Andrés Carvajal; Pearson editions (5th or 6th edition). **Chapter 2, Paragraphs 2.8 to 2.11**

1. Video: Khan academy, Sigma notation: <https://youtu.be/5jwXThH6fg4>
2. Video: Examples of use of the Sigma notation:
 - Example 1: <https://youtu.be/bKhk-fkQN7M>
 - Example 2: <https://youtu.be/0kqTIU7Ef04>

- Example 3: <https://youtu.be/YVhG0u10Gs0>
 - Example 4: <https://youtu.be/3yJRJw9cYl4>
 - Example 5: <https://youtu.be/V0lwyc7iA0k>
3. Video: Worksheet and solutions for more examples if needed: https://youtu.be/scoaZp_AaXk
 4. Exercises: http://maths.langella.free.fr/TSM/Sequence_02/TSM02_Exercises.pdf
 5. Solutions: http://maths.langella.free.fr/TSM/Sequence_02/TSM02_Solutions_part_2.pdf

2.8 Product operator: Pi notation

Estimated workload: **45 minutes**

1. Video: Youtube: <https://youtu.be/XuJ3AmtLs2E>
If you didn't study the logarithms for example, don't bother about the examples that use them.
2. : Examples of use of the product operator: <https://youtu.be/sTD09x86HIk>
3. Exercises: http://maths.langella.free.fr/TSM/Sequence_02/TSM02_Exercises.pdf
4. Solutions: http://maths.langella.free.fr/TSM/Sequence_02/TSM02_Solutions_part_2.pdf