

MATHEMATICS APPLIED TO QUANTITATIVE SOCIAL SCIENCES – INTERMEDIATE LEVEL

Professor(s) : Juliana Pinillos

Academic Year 2020/2021 : Spring Semester

COURSE DESCRIPTION

Taught over 12 sessions, this course aims at providing students with the mathematical foundations needed to support notions taught in the first-year introduction to economics course, and more generally, quantitative methods in social sciences. This course places emphasis on practice, with progressive exercises and case studies, so that students can gain autonomy quickly with the taught themes.

Grading criteria + grading rubrics

Midterm (45%). Sessions 1-5. 45 minutes' exam.

Final Exam (55%). 45 minutes' exam.

Class policy

Please silence your microphone during the sessions so that we can avoid unexpected noise/echo.

Detailed outline

Sessions 1 and 2: Basic operations and functions

- Fractions, indices, rates, percentages
- Development, factorization
- Order of magnitude, relative and absolute values, exact and approached values
- The concept of variable/parameter/constant
- Basic functions (absolute value, linear/non-linear, inverse, power, exponential, logarithm, etc.): characteristics and graphic representations

Sessions 3 and 4: Equations and inequalities

- Linear equations with 1/2 variables
- Equations of second degree (Delta, factorizing, signs)
- Inequalities

Sessions 5: Differentiation (Part I)

- Rate of increase / slope, tangent
- Graphic representation, relative positions of two curves, curve displacement
- Derivative of polynomial, product, quotient and composite functions, and study of variations

Session 6: Differentiation (Part II)

- Second order derivative. Convexity, concavity (one variable)
- Partial derivatives

Sessions 7 and 8: Constrained optimizations

- Constrained and unconstrained Optimization: with one variable, or multiple variables (only looking for critical points)

Session 9: Integration

- Calculation of simple areas (triangle, trapezoid etc.)
- Single variable integrals on a segment

Session 10: Applications of Integration

- Consumer and Producer surplus
- Lorenz Curve
- Gini

Session 11: Real sequences

- convergence (graphical method)
- Sum indices
- Arithmetic and geometric sequences/sums

Session 12: Final exam

BIBLIOGRAPHY

Simon C. and Blume (1994). *Mathematics for Economists*. New York: Norton.