# Academic statement PUCP

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Below is a list of relevant courses taken during my undergraduate mathematics program at PUCP (Pontificia Universidad Católica del Perú). Some courses are from the Master in Economics or the Master in Mathematics (PUCP). Key information regarding this is as follows. At PUCP, a grade above 15 is considered very high. Grades of 17 or above are uncommon. The passing grade is 11, and the maximum grade is 20. The mathematics program (2024) has approximately 50 students in total. Classes usually do not exceed 10 students and it is considered a selective program at entry, which explains the small number of students. A significant portion of the mathematics faculty are PhDs from IMPA, and while the others have their doctorates from the United States or Europe.

Regarding the PUCP Economics program, considered the best in the country according to the QS ranking (see here) it has the same grading scale and standards. That is, a grade above 15 is considered top. The QLab is the first laboratory for Artificial Intelligence and Quantitative Methods for the social sciences in Peru, and is associated to the Economics Deparment. The program's courses are taught by visiting PhDs in Economics, such as Josue Cox, Jorge Tovar, Cristina Tello-Trillo, and Tomas Rau Binder.

In some courses, I have linked my class notes and problem sets in LaTeX (which certainly may have several typos, errors and do no represent necessarily the full content of the course). Syllabi are also available in the folders to which the links lead. I have also included the basic bibliography for each course in the description.

During my undergraduate studies, I served as a Teaching Assistant for various courses. These included Mathematics for Economists III, which covered a basic introduction to continuous and discrete dynamical systems, Mathematics for Economists IV, which focused on nonlinear optimization and an introduction to dynamic optimization, Convex Optimization (for undergraduate mathematicians), Functional Analysis (for undergraduate mathematicians), Microeconomics 2, which explored General Equilibrium, Market Failures, and Asymmetric Information, and Financial Microeconomics (very similar to Microeconomics 2, but exploring more deeply the issues of choice under uncertainty and presenting static and dynamic games with complete information). As a TA, I developed lecture notes, problem sets, their solutions, and assessments for the courses. You can access the material I developed for each course by clicking here.

Finally, this document does not cover the courses from the General Studies Science cycle (corresponding to the first 2 years of university studies). It should be noted that my GPA was 17/20. Also, I have not included my coursework as a student at EPFL, where I attended for one semester as a regular student in the Physics program and the following year, virtually and not as a regular student due to Covid, courses in Computational Physics and Philosophy of Science. I successfully passed the first semester at EPFL (according to 2019 statistics only 5% of students managed to do so directly) and in the virtual courses I obtain a GPA of 5.9/6.

Cumulative GPA in Mathematics and Economics courses at PUCP (third to fifth year): 18.75/20.

# 1 Academic Record

## 1.1 Master of Economics (PUCP)

| Course | Grade | Book | Teacher(s) |
|---|---|---|---|
| Advanced Microeconomics<br>General Equilibrium<br>Asymmetric Information<br>Auction Theory<br>Contract Theory | 19 | Microeconomic Theory<br>by Mas-Colell et al. | Alejandro Lugón, José C. Aguilar<br>Juan C. Carbajal, Mario Bergara |

## 1.2 Master of Mathematics (PUCP)

| Course | Grade | Book | Teacher |
|---|---|---|---|
| Introduction to Optimal Transport | 20 | Optimal Transport Old and New<br>by Cédric Villani | Johel Beltran |

## 1.3 Advanced Courses

| Course | Grade | Book(s) or papers | Professor |
|---|---|---|---|
| Thesis | 20 | Stable Matching as Transportation<br>by F. Echenique et al.<br>Optimal Transport Methods in Economics<br>by Alfred Galichon<br>Convex Optimization<br>by S. Boyd and L. Vandenberghe | Jorge Chávez |
| Advanced Topics in Geometry<br>Bidimensional riemann surfaces<br>complex dynamics and hyperbolic geometry | 20 | Aspectos Geométricos del Análisis Complejo<br>by Alfredo Poirier | Alfredo Poirier |

## 1.4 Mathematics Courses at the Faculty of Science and Engineering (PUCP)

| Course | Grade | Book(s) or papers | Professor |
|---|---|---|---|
| Abstract Algebra | 20 | Abstract Algebra<br>by Israel N. Herstein | Alfredo Poirier |
| General Topology | 19 | Topology; a first course<br>by James Munkres | Rudy Rosas |
| Optimization 1 | 20 | Optimization<br>by Emilio Cerdá | Jorge Chávez |
| Optimization 2 | 20 | Dynamic Optimization<br>by Emilio Cerdá | Jorge Chávez |
| Measure Theory | 19 | Real Analysis<br>by Gerald Folland | Johel Beltrán |
| Advanced Linear<br>and Multilinear Algebra | 19 | Advanced Linear Algebra<br>by Steven Roman | Christian Figueroa |
| Galois Theory | 20 | Galois Theory Through Exercises<br>by Juliusz Brzeziński | Alfredo Poirier |
| Functional Analysis | 19 | Fundamentos de análise funcional<br>by Geraldo Botelho | Percy Fernandez |
| Analysis over Surfaces | 17 | Curso de Análise Vol. 2<br>by Elon Lages | Jesus Zapata |
| Complex Analysis | 20 | Complex Analysis<br>by Serge Lang | Alfredo Poirier |
| Differential Geometry | 20 | Elementary Differential Geometry<br>by Andrew Pressley | Jaime Cuadros |
| Stochastic Processes | 18 | Measure Theory, Probability<br>and Stochastic Processes<br>Brownian Motion, Martingales<br>and Stochastic Calculus<br>by J.F. Le Gall (both) | Johel Beltran |
| Probability Theory | 18 | Probability<br>by A. N. Shiryaev | Jonathan Farfan |
| Discrete Mathematics | 20 | A walk through combinatorics<br>by Milkos Bona | Ricardo Ramos |
| Applied Differential Equations | 20 | Differential Equations BVP<br>by Richard Boyce and William di Prima | Fidel Jimenez |
| Numerical Analysis | Ongoing | An Introduction to Numerical Analysis<br>by Endre Suli | Juan Casavilca |
| Partial Differential Equations | Ongoing | EDP - Um Curso de Graduacao<br>by Valéria Iório<br>Partial Differential Equations<br>by Lawrence Evans | Marcelo Flamarion |

### 1.5 Economics Courses at the Faculty of Social Sciences (PUCP)

| Course | Grade | Book | Teacher |
|---|---|---|---|
| Microeconomics 1 | 19 | Microeconomic Analysis<br>by Hal Varian | José Gallardo |
| Microeconomics 2 | 20 | Microeconomic Theory<br>by Mas-Colell et al. | Pavel Coronado |
| Macroeconomics 1 | 17 | Intermediate Macroeconomics for Latam<br>by Waldo Mendoza | Waldo Mendoza |
| Statistical Inference | 19 | Statistical Inference<br>by George Casella and Roger Berger | Luis Valdivieso |
| Introduction to Econometrics | 20 | Econometrics<br>by Damodar Gujarati and Dawn Porter | Juan León Jara |

## 1.6 Economics Courses at the QLab

| Course | Grade | Books | Teacher |
|---|---|---|---|
| Machine Learning for Social Sciences | 19 | An Introduction to Statistical Learning by Gareth James et al. | Pavel Coronado |
| Time Series for Macroeconomics and Finance | 20 | New Introduction to Multiple Time Series Analysis by Helmut Lütkepohl | Josué Cox |
| Empirical Industrial Organization | 20 | Empirical IO by Victor Aguirregabiria | Jorge Tovar |
| Introduction to Asset Pricing | 19 | Asset Pricing by John Cochrane | Josué Cox |
| Machine Learning y Causal Inference | Seminar Assistance | | Tomás Rau |
| Advanced Topics in IO | Seminar Assistance | | Carlos Noton |