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Relevant Coursework

First, a complete list of my coursework in Economics, Mathematics, Statistics and Econometrics is presented. The grade column indicate the grade in the 20-point scale used by Peruvian universities and the equivalent alphabetic grade according to the European Credit Transfer and Accumulation System (ECTS). Then, a detail description (professor, topics) of the most advanced courses is provided. The following acronyms are used:

UP	Univesidad del Pacífico
PUCP	Pontificia Universidad Católica del Perú
MS. Ec	M.Sc. in Economics
MS. AM	M.Sc. in Applied Mathematics
BS. Ec	B.Sc. in Economics

Economics

(All courses in Economics were received at Universidad del Pacífico)

N.	Level	Course Title	Grade	Textbooks
E1	Grad. MS. Ec	Macroeconomics with Frictions	20(A)	-Ljungqvist, L and Sargent, T., *Recursive Macroeconomic Theory*, 2nd Edition
E2	Grad. MS. Ec	Advanced Macroeconomics II	19(A)	*Several papers -Gali, J., *Monetary Policy, Inflatioin and Business Cycle:An Introduction to the New Keynesian Framework* -Ljungqvist, L and Sargent, T., *Recursive Macroeconomic Theory*, 2nd Edition
E3	Grad. MS. Ec	Advanced Macroeconomics I	20(A)	*Several papers -Blanchard, O. and Fischer, S., *Lectures on Macroeconomics* -Romer, D., *Advanced Macroeconomics*
E4	Grad. MS. Ec	Advanced Microeconomics II	20(A)	-Mas-Collel, A., Whinston, D. and Green, J., *Microeconomic Theory* -Fundenberg, D. and Tirole, J., *Game Theory* -Myerson, R., *Game Teory: Analysis of Conflict*
E5	Grad. MS. Ec	Advanced Microeconomics I	20(A)	-Mas-Collel, A., Whinston, D. and Green, J., *Microeconomic Theory*
E6	Grad. MS. Ec	Financial Economics	20(A)	-Le Roy and Werner, *Principles of Financial Economics* -Hens and Rieger, *Financial Economics: A Concise Introduction*
E7	Grad. MS. Ec	Economics of Regulation	18(A)	-Train, K. *Optimal Regulation. The Economic Theory of Natural Monopoly*

N.	Level	Course Title	Grade	Textbooks
E8	Grad. MS. Ec	Seminar on Theory of Economic Growth	17(A)	- Acemoglu, D. *Introduction to Modern Economic Growth*
E9	Underg. BS. Ec	Dynamic Macroeconomics	18(A)	-Gali, J., *Monetary Policy, Inflatioin and Business Cycle:An Introduction to the New Keynesian Framework*
E10	Underg. BS. Ec	Theory of Economic Development	17(A)	-Baro, R. and Sala i Martin, *Economic Growth*
E11	Underg. BS. Ec	Industrial Organization (Org. of Markets)	18(A)	-Tirole, J. *The Theory of Industrial Organization*
E13	Underg. BS. Ec	Banking Economics	15(A)	-Freixas, X. and Rochet, J. *Microeconomics of Banking* -Mathews, K. and Thompson, J. *Economics of Banking*
E14	Underg. BS. Ec	Macroeconomic of an Open Economy	16(A)	-Obstfeld, M and Rogoff, K. *Foundations of International Macroeconomics*
E15	Underg. BS. Ec	Monetary Theory	20(A)	-Walsh, C. *Monetary Theory and Policy* -Mishkin, F *The Economics of Money Banking and Financial Markets*
E16	Underg. BS. Ec	Economic Policy	19(A)	**No textbooks*
E17	Underg. BS. Ec	Theory on International Commerce	18(A)	-Obstfeld, M and Rogoff, K. *Foundations of International Macroeconomics*
E18	Underg. BS. Ec	Public Economics	16(A)	**No textbooks*
E19	Underg. BS. Ec	Macroeconomics II	17(A)	-Walsh, C. *Monetary Theory and Policy* -Obstfeld, M and Rogoff, K. *Foundations of International Macroeconomics*
E20	Underg. BS. Ec	Microeconomics II	17(A)	-Hal, V. *Intermediate Microeconomics* -Gravelle, H. and Rees, R., *Microeconomics*
E21	Underg. BS. Ec	Macroeconomics I	19(A)	-De Gregorio, J., *Macroeconomía: Teoría y Políticas* -Doepke, M., Lehnert, A. and Sallaren, A., *Macroeconomics*
E22	Underg. BS. Ec	Microeconomics I	17(A)	-Gravelle, H. and Rees, R., *Microeconomics*
E23	Underg. BS. Ec	Economics II	18(A)	-De Gregorio, J., *Macroeconomía: Teoría y Políticas* -Parkin, M. *Macroeconomics*
E24	Underg. BS. Ec	Economics I	20(A)	-Mankiw, G. *Principles of Economics*

Mathematics, Statistics and Econometrics

N.	Level	Course Title	Sch.	Grade	Textbooks or Topics
M0	Grad. MS. AM.	Stochastic Processes**	PUCP	–	Topics:*discrete time stochastic processes (Markov chains, martingales in discrete time), Doob's martingale convergence theorem, uniform integrability, continuous stochastic processes, nonstationary Poisson processes, continuous-time Markov chains, Brownian motion, Ito's Lemma, Levy processes.*
M0	Grad. MS. AM.	Introduction to Dynamic Systems**	PUCP	–	Topics: *Ordinary differential equations, existence and uniqueness of the solution, linear systems, nonlinear systems, difference equations, topics to be selected.*
M0	Grad. MS. AM.	Concavity and Optimization**	PUCP	–	Topics: *Convex sets and properties, separation theorem, nonlinear programming, convex programming, saddle point, Kuhn-Tucker theorem, characterization of first order conditions, Lagrange theorem, applications, sensitivity analysis.*
M1	Grad. MS. Ec	Advanced Mathematics / Real Analysis	UP	20(A)	-De la Fuente, A., *Mathematical Methods and Models for Economists.* -Ok, E., *Real Analysis with Economic Applications.*
M2	Grad. MS. AM.	Measure and Integration	PUCP	17(A)	-Athreya, K.B. and Lahiri, S.N., *Measure Theory and Probability Theory* -Ash, R.B. and Dolans-Dade, *Real Analysis with Economic Applications.*
M3	Grad. MS. AM.	Probability and Statistics	PUCP	18(A)	-Casella, G. and Berger, R., *Statistical Inference* -Hogg, R. and Tanis, E., *Probability and Statistical Inference*
M4	Grad. MS. Ec	Topics of Advanced Econometrics	UP	20(A)	-Hayashi, A., *Econometrics* -Wooldridge, J., *Econometric Analysis of Cross Section and Panel Data* -Hamilton, J., *Time series Analysis*

** I plan to take this course next semester (March-June 2013). However, it is possible that the university does not offer it in the mentioned semester. In that case, I will replace it with another course from the M.S. in Applied Mathematics curricula.

N.	Level	Course Title	Sch.	Grade	Textbooks or Topics
M5	Grad. MS. Ec	Fundamentals of Advanced Econometrics	UP	20(A)	-Hayashi, A., *Econometrics* -Wooldridge, J., *Econometric Analysis of Cross Section and Panel Data* -Hamilton, J., *Time series Analysis*
M6	Grad. MS. Ec	Bayesian Econometrics	UP	20(A)	-Lancaster, T., *Introduction to Modern Bayesian Econometrics* -Koop, G., *Bayesian Econometric Methods*
M7	Grad. MS. Ec	Methods of Prediction and Evaluation	UP	20(A)	-Clements, M. and Hendry, D. *Forecasting Non-Stationary Economic* -West, K. *Forecast Evaluation (Handbook on Economic Forecasting, Vol 1)*
M8	Underg.	Econometrics II	UP	17(A)	Topics: *SUR, simultaneous equations, stationarity and time series models, unit root tests, cointegration, panel data, LDV*
M9	Underg.	Econometrics I	UP	17(A)	Topics: *The general linear model, ordinary least squares, maximum likelihood, inference, prediction, structural break, endogeneity, instrumental variables.*
M10	Underg.	Informatics for Economists	UP	19(A)	Topics: *Eviews, Stata, Visual Basic*
M11	Underg.	Statistics II	UP	18(A)	Topics: *Multivariable distributions, sampling distributions, inference, non-parametric statistics, correlation analysis, regressions*
M12	Underg.	Statistics I	UP	19(A)	Topics: *discrete and continuous random variables, expectations, point and interval estimation, hypothesis testing*
M13	Underg.	Mathematics for Economist	UP	18(A)	Topics: *Linear algebra, dynamic optimization , constrained optimization, differential equations, difference equations, implicit differenciation*
M14	Underg.	Mathematics II	UP	20(A)	Topics: *Multivariable calculus, matrix algebra, linear algebra, static optimization*
M15	Underg.	Mathematics I	UP	20(A)	Topics: *Single variable calculus, analytic geometry, inequalities, geometric representation*

Description of selected courses

A detail description of main courses is provided. It includes grade, textbook, professor and topics.

Economics

E1. Macroeconomics with Frictions. Grade: 20(A)

Professor: Manuel Macera, Ph.D.(c) Economics, University of Minnesota

Textbooks:

- Ljungqvist, Lars, and Thomas J. Sargent. *Recursive Macroeconomic Theory.* 2nd ed. Cambridge, MA: MIT Press, 2004

Topics:

- Complete markets: Deterministic Arrow-Debreu economy (saving problem, competitive equilibrium definition, welfare theorems), stochastic Arrow-Debreu economy, sequential trading: Arrow securities (recursive formulation), equivalences.
- Incomplete markets: Self-insurance (environment, saving problem, quadratic preferences, non-stochastic and stochastic endowments), Bewley economies (heterogeneous agents).
- Endogenous incomplete markets: Limited enforcement (insurance versus incentives), equilibrium without commitment.

E2. Advanced Macroeconomics II. Grade:19(A)

Professor: Paul Castillo, Ph.D. Economics, London School of Economics (LSE).

Textbooks:

- *Several papers.*
- Ljungqvist, Lars, and Thomas J. Sargent. *Recursive Macroeconomic Theory.* 2nd ed. Cambridge, MA: MIT Press, 2004
- Gali, Jordi. *Monetary Policy, Inflation and the Business Cycle: An Introduction to the New Keynesian Framework.* Princeton University Press, 2003.
- Woodford, M. Interest and Prices. *Foundations of a Theory of Monetary Policy*, Princeton University Press, 2003

Topics:

- Competitive equilibrium with complete markets: Complete financial markets, competitive equilibrium definition, implications over business fluctuations and asset pricing.
- Business fluctuations and stylized fact: Co-movements between real and nominal variables, stationarity, trends, cycles, linearity, and nonlinearity.
- Real business fluctuations: Two period model, consumption/ saving inter-temporal decision, analytical and numerical solution, centralized and decentralized economies, capital accumulation, labor/ leisure decision, employment, investment, adjustment costs.

- Nominal frictions: The New Keynesian Model (NKM), staggering of price decisions, coordination problems, the "modern Phillips curve."
- Monetary policy: Optimal monetary policy, time consistency, lineal approximations, quadratic approximations, relative price distortions, interest rate rules.
- Fiscal policy and government expenditure: Effects of government spending on consumption, optimal fiscal policy, interaction between fiscal and monetary policy.
- Credit frictions: credit frictions in NKM, agency costs, financial accelerator.
- Open economy: NKM for a small open economy, monetary policy and exchange rate volatility, complete and incomplete financial markets, current account and monetary policy, commodities prices and business cycles in small open economies.
- Real rigidities, labor market and unemployment: Search and matching, unemployment in the NKM, real wage rigidities.

E3. Advanced Macroeconomics I. Grade:20(A)

Professor: Juan Mendoza, Ph.D. Economics, Brown University.

Textbook:

- *Several papers.*
- Blanchard, O., and S. Fischer. *Lectures on Macroeconomics.* Cambridge, MA: MIT Press, 1989.
- Romer, David. *Advanced Macroeconomics.* New York, McGrawHill, 2006.

Topics:

- Consumption/ Saving: Keynes and the consumption function, the consumption/ saving decision, permanent income hypothesis, life cycle hypothesis, Ricardian equivalence, uncertainty of lifespan and consumption, precautionary savings, Euler equation, habits formation, intertemporal consistency and hyperbolic discount, empirical evidence.
- Economic growth: The Solow growth model, the Solow growth model with human capital, the Cass-Ramsey model, the overlapping generations model, growth in a small open economy, Ricardo-Malthus model, Kremer model, endogenous growth (AK, Spillovers, Human Capital, Research and Development).
- Asset Pricing: Asset prices in the CAPM model, the CAPM and consumption, Lucas asset-pricing model, international diversification.
- Investment: Adjustment costs, real state investment, asymmetric information and financial markets, Modigliani-Miller theorem, bank runs, irreversible investment.
- Unemployment and coordination failures: Efficiency wages, Negishi-Solow efficiency wages, Shapiro-Stiglitz Model, searching model, coordination failures.

E4 Advanced Microeconomics II. Grade: 20(A)

Professor: Francisco Galarza, Ph.D. Applied Economics, U. of Winconsin-Madison

Textbook:

- A. Mas-Colell, D. Whinston y J. Green, *Microeconomic Theory*, Oxford University Press, 1995.
- D. Fudenberg y J. Tirole, *Game Theory*, The MIT Press, 1991.
- R. Myerson, *Game Theory: Analisis of Conflict*, Harvard University Press, 1997.

Topics:

- Basic elements in non-cooperative games: Normal form representation of a game, extensive form representation of a game, randomized choices.
- Static games of complete information: Dominate and dominated strategies, rationalizable strategies, Nash equilibrium, existence and properties of Nash equilibrium.
- Dynamic games of complete information: Sequential rationality, backward induction, and subgame perfection, beliefs and sequential rationality.
- Static games of incomplete information: Bayesian Nash equilibrium, the possibility of mistakes: trembling-hand perfection.
- Dynamic games of incomplete information: Perfect Bayesian equilibrium, extensive-form refinements (sequential equilibrium), strategic form refinements (trembling-hand perfect equilibrium).
- Repeated games: The repeated prisoners dilemma, a general model of repeated games, stationary equilibrium of repeated games with complete information and discounting, one shot deviation principle.

E5. Advanced Microeconomics I. Grade: 20(A)

Professor: Miguel A. Carpio, Ph.D. Economics, Universitat Pompeu Fabra.

Textbook:

- A. Mas-Colell, D. Whinston y J. Green, *Microeconomic Theory*, Oxford University Press, 1995.

Topics:

- Preference and Choice: Preference relations, choice rules, the relationship between preference relations and choice rule.
- Consumer choice: Commodities, the consumption set, competitive budgets, demand functions and comparative statistics, the weak axiom of revealed preference and the law of demand.
- Classical demand theory: Preference relations, preference and utility, the utility maximization problem, the expenditure minimization problem, duality, relationships between demand, indirect utility, and expenditure functions, welfare evaluations of economic changes.
- Aggregate demand: Aggregate demand and aggregate wealth, aggregate demand and weak axiom, aggregate demand and the existence of the representative consumer.
- Production: Production sets, profit maximization and cost minimization, aggregation.
- Choice under uncertainty: Expected utility theory, money lotteries and risk aversion, state-dependent utility.

E6. Advanced Financial Economics. Grade 20(A)

Professor: Jose Fajardo, Ph.D Mathematical Economics, Institute of Pure and Applied Mathe-

matics(IMPA), Brazil.

Textboks:

- Le Roy and Werner, *Principles of Financial Economics*, 2000.
- Hens and Rieger, *Financial Economics: A Concise Introduction to Classical and Behavioral Finance*, 2010.

Topics:

- Decision theory: Expected utility theory, mean-variance theory, prospect theory (origins, cumulative prospect theory, weighting function, continuity, extensions), ambiguity and uncertainty, time discounting.
- Equilibrium, arbitrage and asset pricing in a two period model: two period model, non-arbitrage condition (fundamental theorem of asset pricing - FTAP), financial market equilibrium, special cases: CAPM, APT and behavioral CAPM, Pareto efficiency, aggregation.

E7. Economics of Regulation. Grade 18(A)

Professor: Martin Rossi, Ph.D. Economics, University of Oxford.

Textboks:

- Train, K. *Optimal Regulation. The Economic Theory of Natural Monopoly*, The MIT Press, 1991.
- Berg, S. *Natural monopoly Regulation, Cambridge University Press*, 1986.

Topics:

- Natural monopoly, price discrimination, Ramsey prices.
- Regulation: Maximum price regulation, price cap regulation (RPI-X)
- Optimal regulation under asymmetric information: Volgelsang and Finsinger mechanism, regulation and moral hazard, regulation and adverse selection.
- Yardstick competition.

E8. Seminar on Theory of Economic Growth. Grade 17(A)

Professor: Edwin Goñi, Ph.D. Economics, European University Institute.

Textboks:

- Acemoglu, D. *Introduction to Modern Economic Growth.* Cambridge, MA: Massachusetts Institute of Technology, 2007.

Topics:

- Solow growth model, Ramsey model, introduction to AK models.
- Learning-By-Doing model
- Romer model
- Schumpeterian model: Creative - destruction, innovation vs. imitation, embodied technological change.

Mathematics, Statistics and Econometrics

M1. Advanced Mathematics-Real Analysis. Grade: 20(A)

Professor Juan Zapata, Ph.D. Mathematics, Institute for Pure and Applied Mathematics (IMPA), Brazil.

Textbooks:

- De la Fuente, A., *Mathematical Methods and Models for Economists.* Cambridge University Press, 2000.
- Ok, E., *Real Analysis with Economic Applications.* Princeton University Press, 2007.

Topics:

- Preliminaries: real sequences, R^n space and properties, real functions.
- Metric spaces: Definition and properties of metric spaces, convergence of sequences, open and closed sets, continuity, completeness, fixed point theory, compactness and extreme value theorem, connectedness, intermediate value theorem.
- Vector spaces: Definition and properties of vector spaces, bases and dimension, linear transformations, linear mapping between normed spaces, normed vector spaces, Banach spaces.
- Correspondences theory: Definition and properties, continuity of correspondences, the maximum theorem, Kakutani's fixed point theorem, Michael's selection theorem.
- Differential calculus: Frchet derivative and properties, Frchet derivative of a function, maximization of functions.
- Dynamic optimization: Review of static optimization, the Kuhn-Tucker problem, optimal control, calculus of variations, dynamic programming, principle of optimality, Bellman equation.

M2.Measures and Integration. Grade: 17(A)

Professor: Eladio Ocana, Ph.D. Mathematics, Universite Blaise Pascal.

Textbooks:

- Athreya, K.B. and Lahiri, S.N., *Measure Theory and Probability Theory* Springer Texts in Statistics, 2010.
- Ash, R.B. and Dolans-Dade, *Real Analysis with Economic Applications.* Second Edition, Academic Press, 2000.

Topics:

- Preliminaries: Classes of sets, images and inverse images of functions, countable and uncountable sets, supreme and infimum, indicator function.
- Measures: sigma-algebra, sigma-algebra generated by a family of sets, (finite, sigma-finite, and probability) measures, extension theorems and Lebesgue-Stieltjes measures.
- Measurable spaces and measurable functions: Definitions and examples, operations with measurable functions, induced measures, distribution functions.
- Integration: Riemann integration, Lebesgue integration, integration of non-negative simple functions, integration of non-negative measurable functions, Lebesgue's monotone convergence

theorem, Integration of measurable functions, Lebesgue's dominated convergence theorem.

- Differentiation: The Lebesgue-Radon-Nikodym theorem, distribution functions.
- Product measures: Product spaces and product measures, Fubini-Tonelli theorems.
- Lp-Spaces: Properties, inequalities.
- Convergence: Types of convergence and relationships, almost everywhere convergence, almost uniform convergence, Lp convergence, convergence in measure, convergence in distribution.

M3. Probability and Statistics. Grade:18(A)

Professor: Luis Valdivieso, Ph.D. in Sciences, Katholieke Universiteit Leuven, Belgium

Textbooks:

- Casella, G. and Berger, R., *Statistical Inference* Duxbury, USA
- Hogg, R. and Tanis, E., *Probability and Statistical Inference* 7th edition. Prentice Hall.

Topics:

- Probability spaces: Sigma-algebras, probability measure, conditional probability, independence.
- Random elements: Distribution of a random element, discrete and continuous random vectors.
- Expected value: Review of integration theory, expected value of a random varible, moment-generating functions, characteristic functions.
- Sampling distributions: Random sample, sample distributions.
- Convergence of random variables: Orders of convergence, modes of convergence, law of large numbers, central limit theorems, asymptotic behavior of estimators, statistical tests.

M4. Topics in Advanced Econometrics. Grade: 20(A)

Professor: Diego Winkelried, Ph.D. Economics, University of Cambridge

Textbooks:

- Hayashi, A., *Econometrics* Princeton University Press, 2000.
- Wooldridge, J., *Econometric Analysis of Cross Section and Panel Data* MIT Press, 2002.
- Hamilton, J., *Time series Analysis* Princeton University Press, 1994.

Topics:

- Panel Data Models
  - "Classical" panel estimators: Short panel and identifying assumptions, pooled estimator, between estimator, within estimator, generalized least squares, first difference estimator.
  - Instrumental variables estimation with panel data: Generalized method of moments for panel data, dynamic estimators for panel data (Arellano-Bond).
- Time Series Models
  - Unit root econometrics: super consistency and deterministic trends, Beveridge-Nelson decomposition and integrated processes, Wiener process and the functional central limit theorem, Dickey-Fuller test and augmented Dickey-Fuller test.

- Cointegration: Cointegrated systems, representations, implications for estimation, ML with complete information (Johansen).
- Unobservable Components Models: Local level model, state space representation and Kalman filter, estimation, smoothing.

M5. Fundamentals of Advanced Econometrics. Grade:20(A)

Professor: Diego Winkelried, Ph.D. Economics, University of Cambridge

Textbooks:

- Hayashi, A., *Econometrics* Princeton University Press, 2000.
- Wooldridge, J., *Econometric Analysis of Cross Section and Panel Data* MIT Press, 2002.
- Hamilton, J., *Time series Analysis* Princeton University Press, 1994.

Topics:

- Linear Models
  - Preliminaries: Matrix algebra, multivariate statistics, asymptotic theory.
  - Ordinary least squares (OLS) 1: Derivation, Frisch-Waugh-Lovell theorem, finite-sample properties, Gauss Markov theorem, hypothesis testing, restricted least squares, Lagrange multipliers tests.
  - OLS 2: Asymptotic properties, large sample inference, robust covariance matrix estimator (HAC estimator), specification problems.
  - Generalized least squares (GLS): Estimation principles and properties, Aitken theorem, feasible generalized least squares, heteroscedasticity, inference with clustered data, seemingly unrelated regressions.
  - Instrumental variables: Endogeneity problem, measurement error and instrumental variables estimator, under-identified and over-identified models, Hausman Test, Durbin-Wu-Hausman test, Hansens J test, Sargan test.
- Non-linear Models
  - Extremum estimators 1: Problem formulation, asymptotic normality and hypothesis testing (Wald, Lagrange multipliers), non-linear least squares, Gauss regressions.
  - Extremum estimators 2: Maximum likelihood (ML) and properties, information matrix and Rao-Cramer bound, generalized linear model: binary models (logit, probit), exponential regressions, count data, etc.
- Time Series Models
  - Difference equations: Lag operators, dynamic multipliers, basic definitions.
  - Stationarity and time series models: Wold's decomposition, moments, prediction.
  - Estimation of stationary time series: Ergodicity and asymptotic theory, covariance function and its estimation, least squares, maximum likelihood, consistency and robust inference, super-consistency.

M6. Bayesian Econometrics. Grade: 20(A)

Professor: Alejandro Arrieta, Ph.D. Economics, Rutgers University

Textbooks:

- Lancaster, Tony. *Introduction to Modern Bayesian Econometrics*. Blackwell Publishing, 2004.
- Koop, G., Poirier, D. and Tobias, J. *Bayesian Econometric Methods*, Cambridge University Press, 2007.

Topics:

- The Bayesian Algorithm: Bayes theorem, components of Bayes theorem (likelihood, prior, posterior).
- Linear regression models.
- Markov Chains: Discrete and continuous.
- Bayesian calculations: Normal approximation, exact sampling in one step, Markov Chain Monte Carlo (MCMC), general methods to construct kernels (Gibbs sampling and the Metropolis Hastings algorithm).
- Test of convergence in MCMC.
- Non-linear regression models: Binary choice models, multinomial choice models, duration models.
- Instrumental variables.