

**FINANCE 937**  
**Advanced Topics in Macro Finance**  
**Fall 2015**

**Professor João F. Gomes**  
Office Hours Tuesday 1:30-2:30  
SHDH 2329

**DESCRIPTION**

Finance 937 is an advanced course in quantitative theory applied to macro and finance models. It is intended for doctoral students in finance, economics and related fields. The course focuses on four broad theoretical literatures: (i) firm investment and growth; (ii) corporate, household and sovereign debt; (iii) asset pricing in general equilibrium; and (iv) equilibrium macro models with a financial sector. My approach is to develop and discuss in detail a unified framework that is suited to address most topics, usually covering a few central topics and the core papers. We then discuss the more recent literature, highlighting how authors combine and expand upon the core ideas. This part of the course usually relies on regular student presentations.

## TOPICS AND READING LIST

### Firm Investment, Selection and Growth

#### Core Readings

- Abel, Andrew and Eberly, Janice, A Unified Model of Investment Under Uncertainty, *American Economic Review*, 1994
- Gomes, João, Financing Investment, *American Economic Review*, 2001
- Hopenhayn, Hugo, Entry, Exit, and Firm Dynamics in Long Run Equilibrium, *Econometrica*, 1992
- Jovanovic, Boyan and Rousseau, Peter, The Q-Theory of Mergers, *American Economic Review*, 2002.

#### Further Reading

- Abel, Andrew and Blanchard, Olivier, The Present Value of Profits and Cyclical Movements in Investment, *Econometrica*, 1986
- Andrade, Gregor, Mitchell, Mark, and Stafford, Eric, New Evidence and Perspective on Mergers, *Journal of Economic Perspectives*, 2001
- Axtell, Robert, Zipf Distribution of U.S. Firm Sizes, *Science*, 2001
- Blanchard, Olivier, Lopez-de-Silanes, Florencio, and Shleifer, Andrei, What do Firms do with Cash Windfalls? *Journal of Financial Economics*, 1993
- Bond, Stephen, and Meghir, Costas, Dynamic Investment Models and the Firm's Financial Policy, *Review of Economic Studies*, 61, 1994
- Caballero, Ricardo, and Engel, Eduardo, Explaining the Investment Dynamics in U.S. Manufacturing: A Generalized (S,s) Dynamics, *Econometrica*, 1999
- Chirinko, Robert, Business Fixed Investment Spending: Modeling Strategies, Empirical Results, and Policy Implications, *Journal of Economic Literature*, 1993
- Clementi, Gian Luca and Dino Palazzo, Entry, Exit, Firm Dynamics, and Aggregate Fluctuations, Working Paper, New York University, 2012
- DeMarzo, Peter, Michael Fishman, Zhiguo He, and Neng Wang, Dynamic Agency and the q Theory of Investment, *Journal of Finance*, 2009
- Dixit, Avinash, and Pindyck, Robert, Ch. 5, 6, 10 and 11, Investment Under Uncertainty, Princeton University Press, 1994
- Doms, Mark, and Dunne, Timothy, Capital Adjustment Patterns in Manufacturing Plants, *Review of Economic Dynamics*, 1, 409-29, 1998
- Eisefeldt, Andrea and Rampini, Adriano, New or Used, Investment with Financing Constraints, *Journal of Monetary Economics*, 2007
- Ericson, Richard and Pakes, Ariel, Markov Perfect Industry Dynamics: A Framework for Empirical Work, *Review of Economic Studies*, 1995
- Fazzari, Steven, Hubbard, Glenn and Petersen, Bruce, Financing Constraints and Corporate Investment, *Brookings Papers on Economic Activity*, 1988
- Gabaix, Xavier, Granular Origins of Business Cycles, *Econometrica*, 2011

- Glover, Brent and Levine, Oliver, Uncertainty, Investment and Managerial Incentives, , *Journal of Monetary Economics*, 2014
- Gilchrist, Simon, and Himmelberg, Charles, Evidence on the Role of Cash Flow for Investment, *Journal of Monetary Economics*, 1995
- Gala, Vito and Gomes, João, Beyond Q: Investment without Asset Prices, working paper, Wharton School, 2014
- Gomes, João and Livdan, Dmitry, Optimal Diversification: Reconciling Theory and Evidence, *Journal of Finance*, 2004
- Gourio, Francois and Miao, Jianjun, Transitional Dynamics of Dividend and Capital Gains Tax Cuts, *Review of Economic Dynamics*, 2010
- Hall, Robert, The Stock Market and Capital, *American Economic Review*, 2001
- Hennessy, Christopher, Tobin's  $q$ , Debt Overhang, and Investment, *Journal of Finance*, 2004
- Hubbard, R. Glenn, Capital-Market Imperfections and Investment, *Journal of Economic Literature* 1998
- Jovanovic, Boyan and Braguinsky, Sergey, Bidder Discounts and Target Premia In Takeovers, *American Economic Review*, 2004
- Lamont, Owen A., Investment Plans and Stock Returns, *Journal of Finance*, 2000
- Lettau, Martin, and Ludvigson, Sydney, Time-Varying Risk Premia and the Cost of Capital: An Alternative Implication of the Q Theory of Investment, *Journal of Monetary Economics*, 2002
- Love, Inessa, Financial Development and Financing Constraints: International Evidence from the Structural Investment Model, *Review of Financial Studies*, 2003
- Lucas, Robert, On the Size Distribution of Business Firms, *Bell Journal of Economics*, 1978
- Lucas, Robert, and Prescott, Edward, Investment Under Uncertainty, *Econometrica*, 1971
- Luttmer, Erzo, Selection, Growth and the Size Distribution of Firms, *Journal of Political Economy*, 2007
- Krusell, Per and Smith, Anthony, Income and Wealth Heterogeneity in Macroeconomics, *Journal of Political Economy*, 1998
- Moyen, Nathalie, Investment Cash Flow Sensitivities: Constrained vs. Unconstrained Firms, *Journal of Finance*, 2004
- Philippon, Thomas, The Bond Market's Q, *Quarterly Journal of Economics*, 2009
- Ramey, Valerie and Shapiro, Matthew, Displaced Capital: a Study of Aerospace Plant Closings, *Journal of Political Economy*, 2001
- Warusawitharana, Missaka, Corporate Asset Purchases and Sales: Theory and Evidence, *Journal of Financial Economics*, 2008
- Whited, Toni, Debt, Liquidity Constraints, and Corporate Investment: Evidence from Panel Data, *Journal of Finance*, 1992
- Whited, Toni, External Finance Constraints and the Intertemporal Pattern of Intermittent Investment, *Journal of Financial Economics*, 2006

## Models of Corporate, Household and Sovereign Debt

### Core Readings

- Arellano, Cristina, Default Risk and Income Fluctuations in Emerging Economies, *American Economic Review*, 2008
- Chatterjee, Satyajit, Corbae, Dean, Nakajima, Makoto and Rios-Rull, Jose-Victor, A Quantitative Theory of Unsecured Consumer Credit with Risk of Default, *Econometrica*, 2007
- Chatterjee, Satyajit, and Eyigungor. Burcu, Maturity, Indebtedness, and Default Risk, *American Economic Review*, 2012
- Gomes, João and Lukas Schmid, Levered Returns, *Journal of Finance*, 2010
- He, Zhinguo and Milbradt, Konstantin, Endogenous Liquidity and Defaultable Bonds, *Econometrica*, 2013.
- Hennessy, Christopher, and Toni Whited, Debt Dynamics, *Journal of Finance*, 2005
- Leland, Hayne, Corporate Debt Value, Bond Covenants, and Optimal Capital Structure, *Journal of Finance*, 1994

### Further Reading

- Almeida, Heitor, and Thomas Philippon, The Risk-Adjusted Cost of Financial Distress, *Journal of Finance*, 2007.
- Altı, Aydogan, How Persistent Is the Impact of Market Timing on Capital Structure? *Journal of Finance*, 2006
- Andrade, Gregor, and Steven N. Kaplan, How Costly is Financial (Not Economic) Distress? Evidence from Highly Leverage Transactions that Became Distressed, *Journal of Finance*, 1998.
- Atkeson, Andrew, Eisfeldt, Andrea and Weill, Pierre-Olivier, Measuring the Financial Soundness of US Firms, 1926-2012, working paper, UCLA, 2014
- Arellano, Cristina, and Ramanarayanan, Ananth Default and the Maturity Structure in Sovereign Bonds, *Journal of Political Economy* 2012
- Bhamra, Harjoat, Kuehn, Lars Alexander and Strebulaev, Ilya, The Levered Equity Risk Premium and Credit Spreads: A Unified Framework, *Review of Financial Studies*, 2010
- Bolton, Patrick, Hui Chen, and Neng Wang, A Unified Theory of Tobin's q, Corporate Investment, Financing, and Risk Management, *Journal of Finance*, 2009.
- Brennan, Michael, and Schwartz, Eduardo, Optimal Financial Policy and Firm Valuation, *Journal of Finance*, 1984.
- Chen, Hui, Macroeconomic Conditions and the Puzzles of Credit Spreads and Capital Structure, *Journal of Finance*, 2010
- Chen, Long, Pierre Collin-Dufresne, and Robert Goldstein, On the Relationship Between the Credit Spread Puzzle and the Equity Premium Puzzle, *Review of Financial Studies*, 2009

- Chen, Hui and Manso, Gustavo, Macroeconomic Risk and Debt Overhang, Working paper, MIT, 2010
- Cole, Harold, and Kehoe, Timothy, Self-Fulfilling Debt Crises, *Review of Economic Studies*, 2000
- Corbae, Dean, Quintin, Erwan, Leverage and the Foreclosure Crisis, *Journal of Political Economy*, 2015
- Eaton, Jonathan, and Gersovitz, Mark, Debt with Potential Repudiation: Theoretical and Empirical Analysis, *Review of Economic Studies*, 1983
- Fischer, Edwin, Heinkel, Robert, and Zechner, Josef, Dynamic Capital Structure Choice: Theory and Tests, *Journal of Finance*, 1989.
- Glover, Brent, The Expected Cost of Default, *Journal of Financial Economics*, 2014
- Goldstein, Robert, Ju, Nengjiu, and Leland, Hayne, An EBIT Based Model of Dynamic Capital Structure, *Journal of Business*, 2001.
- Graham, John, Debt and the Marginal Tax Rate, *Journal of Financial Economics*, 1996
- Hackbarth, Dirk, Jianjun Miao, and Erwan Morellec, Capital Structure, Credit Risk, and Macroeconomic Conditions, *Journal of Financial Economics*, 2006
- Hatchondo, Juan Carlos, Martinez, Leonardo and Sapriz, Horacio, Quantitative Properties of Sovereign Default Models: Solution Methods Matter, *Review of Economic Dynamics* 2010
- Hennessy, Christopher, and Toni M. Whited, How Costly is External Financing? Evidence from a Structural Estimation, *Journal of Finance*, 2007.
- Kaplan, Steve and Stein, Jeremy, How Risky is the Debt in Highly Leveraged Transactions?, *Journal of Financial Economics*, 1990
- Korteweg, Arthur, The Net Benefits to Leverage, *Journal of Finance*, 2010
- Leary, Mark and Roberts, Michael, Do Firms Re-Balance Their Capital Structures? *Journal of Finance*, 2005
- Lemmon, Michael, Roberts, Michael and Zender, Jaime, Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure, *Journal of Finance*, 2008
- Leland, Hayne, and Klaus Toft, Optimal Capital Structure, Endogenous Bankruptcy, and the Term Structure of Credit Spreads, *Journal of Finance*, 1996
- Mendoza, Enrique, and Yue, Vivian, A General Equilibrium Model of Sovereign Default and Business Cycles, *Quarterly Journal of Economics*, 2012.
- Miller, Merton, Debt and Taxes, *Journal of Finance*, 1977
- Rajan, Raghuram, and Zingales, Luigi, What do we Know About Capital Structure? Some Evidence From International Data, *Journal of Finance*, 1995
- Rampini, Adriano and Viswanathan, S., Collateral and Capital Structure, *Journal of Financial Economics*, 2013.
- Riddick, Leigh, and Whited, Toni, The Corporate Propensity to Save, *Journal of Finance*, 2009

- Shleifer, Andrei, and Robert Vishny, Liquidation Values and Debt Capacity: A Market Equilibrium Approach, *Journal of Finance*, 1992
- Strebulaev, Ilya, Do Tests of Capital Structure Theory Mean What They Say? *Journal of Finance*, 2007.
- Strebulaev, Ilya, and Yang, Baozhong, The Mystery of Zero Leverage Firms, *Journal of Financial Economics*, 2012
- Warusawitharana, Missaka and Whited, Toni, Equity Market Misvaluation, Financing and Investment, Working Paper, University of Rochester, 2014
- Welch, Ivo, Capital Structure and Stock Returns, *Journal of Political Economy*, 2004.

## Firms, Production and Equity Prices

### Core Papers

- Cochrane John, Production-Based Asset Pricing and the Link Between Stock Returns and Economic Fluctuations, *The Journal of Finance*, 1991
- Gomes, João, Yaron, Amir and Zhang, Lu, Asset Pricing Implications of Firms' Financing Constraints, *Review of Financial Studies*, 2006
- Gomes, João, Leonid Kogan and Lu Zhang, Equilibrium Cross Section of Returns, *Journal of Political Economy*, 2004
- Jermann, Urban, Asset Pricing in Production Economies, *Journal of Monetary Economics*, 1998
- Kaltenbrunner, Georg and Loechster, Lars, Long Run Risk Through Consumption Smoothing, *Review of Financial Studies*, 2008

### For Possible Presentation

- Albuquerque, Rui, and Neng Wang, Agency Conflicts, Investment, and Asset Pricing, *Journal of Finance*, 2008
- Belo, Frederico, Production-Based Measures of Risk for Asset Pricing, *Journal of Monetary Economics*, 2010
- Belo, Frederico, Vito Gala and Li, Government Spending, Political Cycles and the Cross-Section of Stock Returns, *Journal of Financial Economics*, 2013
- Bena, Jan and Garlappi, Lorenzo, Corporate Innovation and Returns, Working Paper, UBC, 2013
- Berk, Jonathan B, Richard C. Green and Vasant Naik, Optimal Investment, Growth Options, and Security Returns, *Journal of Finance*, 1999
- Boldrin, Michele, Christiano, Lawrence and Fisher, Jonas, Habit Persistence, Asset Returns and the Business Cycle, *American Economic Review*, 1999
- Carlson, Murray, Adlai Fisher, and Ronald Giammarino, Corporate Investment and Asset Price Dynamics: Implications for the Cross-Section of Returns, *Journal of Finance*, 2004
- Christiano, Lawrence, and Fischer, Jonas, Stock Market and Investment Good Prices: Implications for Macroeconomics, Working Paper, NBER, 2003
- Croce, Mariano, Long Run Productivity Risk, working paper, UNC, 2013
- Cooper, Ilan, Asset Pricing Implications of Non-Convex Adjustment Costs of Investment, *Journal of Finance*, 2004
- Davis, James L., Eugene F. Fama, and Kenneth R. French, Characteristics, Covariances, and Average Returns: 1929-1997, *Journal of Finance*, 2000
- Donangelo, Andres, Labor Mobility: Implications for Asset Pricing, *Journal of Finance*, 2013
- Gomes, João, Leonid Kogan and Motohiro Yogo, Durability of Output and the Cross Section of Expected Returns, *Journal of Political Economy*, 2004

- Eisfeldt, Andrea and Papanikolaou, Dimitris, Organizational Capital and the Cross Section of Expected Returns, *Journal of Finance*, 2014
- Favilukis, Jack, Ludvigson, Sydney and Van Nieuwerburgh, Stijn, The Macroeconomic Effects of Housing Wealth, Housing Financing and the Limited Risk-Sharing in General Equilibrium, working paper, NYU, 2011
- Favilukis, Jack and Xiaoji, Lin, Wage Rigidity: A Quantitative Solution to Several Asset Pricing Puzzles, working paper, London School of Economics, 2013
- Garlappi, Lorenzo and Yan, Hong, Financial Distress and the Cross Section of Expected Returns, *Journal of Finance*, 2011
- Garleanu, Nicolae, Kogan, Leonid and Panageas, Stavros, Displacement Risk and Asset Returns, *Journal of Financial Economics*, 2012
- Garleanu, Nicolae, Panageas, Stavros, and Yu, Jiangfeng, Technological Growth and Asset Pricing, *Journal of Finance*, 2012
- Gourio, Francois, Disaster Risk and Business Cycles, *American Economic Review*, 2012
- Guvenen, Fatih, A Parsimonious Macroeconomic Model for Asset Pricing: Habit Formation or Cross-sectional Heterogeneity?, *Econometrica*, 2010
- Kogan, Leonid and Papanikolaou, Dimitris, Firm Characteristics and Stock Returns: The Role of Investment Specific Shocks, *Review of Financial Studies*, 2013
- Kogan, Leonid and Papanikolaou, Dimitris, Growth Opportunities, Technology Shocks and Asset Prices, forthcoming, *Journal of Finance*, 2014
- Kuehn Lars-Alexander, Asset Pricing with Real Investment Commitment, Working Paper, Carnegie Mellon University, 2008
- Kuehn, Lars-Alexander, Nicolas Petrosky-Nadeau, and Lu Zhang, An Equilibrium Asset Pricing Model with Labor Market Search, working paper, The Ohio State University, 2012
- Kung, Howard and Schmid, Lukas, Innovation, Growth, and Asset Prices, *Journal of Finance*, 2014
- Loualiche, Eric, Asset Pricing with Entry and Imperfect Competition, working paper, MIT 2014
- Liu Laura, Whited, Toni, and Zhang, Lu, Investment-Based Expected Stock Returns, *Journal of Political Economy*, 2009
- Menzly Lior, Tano Santos, Pietro Veronesi, The Time Series of the Cross Section of Asset Prices, *Journal of Political Economy*, 2004.
- Merz, Monika, and Eran Yashiv, Labor and the Market Value of the Firm, *American Economic Review*, 2007.
- Palazzo, Dino, Cash Holdings, Risk and Expected Returns, *Journal of Financial Economics*, 2012
- Papanikolaou, Dimitris, Investment Shocks and Asset Prices, *Journal of Political Economy*, 2011
- McGrattan, Ellen, and Prescott, Edward, Taxes, Regulation and the Value of UK and US Corporations, *Review of Economic Studies* 2005
- Restoy, Fernando, and Rockinger, Michael, On Stock Market Returns and Returns on

Investment, *Journal of Finance*, 1994

- Rouwenhorst, Geert, Asset Pricing Implications of Equilibrium Business Cycle Models, in *Frontiers of Business Cycle Research*, Thomas Cooley (ed.), Princeton University Press, 1995
- Tuzel, Selale, Corporate Real Estate Holdings and the Cross Section of Stock Returns, *Review of Financial Studies*, 2010
- Vassalou, Maria, News Related to Future GDP Growth as a Risk Factor in Equity Returns, *Journal of Financial Economics*, 2003
- Weber, Michael, Nominal Rigidities and Asset Prices, Working Paper, University of Chicago, 2014
- Zhang, Lu, The Value Premium, *Journal of Finance*, 2005
- Zhang, Mindy, Who Bears Firm Level Risk, Working Paper, UCLA, 2014

## Macroeconomic Models with Financial Frictions

### Core Papers

- Bernanke, Ben, Gertler, Mark and Gilchrist, Simon, The Financial Accelerator in a Quantitative Business Cycle Framework, *Handbook of Macroeconomics*, 1999
- Chari, V. Kehoe, Patrick and McGrattan, Ellen, Accounting for Business Cycles, *Econometrica*, 2007
- Cooley, Thomas, Marimon, Ramon, and Quadrini, Vincenzo, *Aggregate Consequences of Limited Contract Enforceability*, *Journal of Political Economy*, 2004
- Corbae, Dean and Pablo D'Erasmus, A Quantitative Model of Banking Industry Dynamics, working paper, University of Wisconsin, 2011
- Gomes, João and Schmid, Lukas, Equilibrium Credit Spreads, Working Paper, Wharton School, 2014
- Gomes, João, Jermann, Urban and Schmid, Lukas, Sticky Leverage, working paper, Wharton School, 2015
- Jermann, Urban and Quadrini, Vincenzo, Macroeconomic Effects of Financial Shocks, *American Economic Review*, 2011
- Van den Heuvel, The Welfare Cost of Bank Capital Requirements, *Journal of Monetary Economics*, 2006

### For Possible Presentation and Further Reading

- Allen, Franklin, Elena Carletti and Douglas Gale, Money Financial Stability and Efficiency, *Journal of Economic Theory*, 2012
- Begenau, Juliane, Capital Requirements, Risk Choice and Liquidity Provision in a Business Cycle Model, working paper, Harvard Business School. 2015.
- Begenau, Juliane and Salomao, Juliana, Firm Financing over the Business Cycle Model, working paper, Harvard Business School. 2015
- Bhamra, Harjoat, Fischer, Adlai and Kuehn, Lars-Alexander, Monetary Policy and Corporate Default, *Journal of Monetary Economics*, 2013
- Bigio, Saki, Endogenous Liquidity and the Business Cycle, working paper, Columbia University, 2013
- Boissay, Frederic, Collard, Fabrice and Smets, Frank, Booms and Systemic Banking Crises, Working Paper, European Central Bank 2012
- Brunnermeier, Markus and Yuliy Sannikov, A Macroeconomic Model with a Financial Sector, *American Economic Review*, 2013
- Carlstrom, Charles and Fuerst, Timothy, Agency Costs, Net Worth and Business Fluctuations: A Computable General Equilibrium Approach, *American Economic Review*, 1997
- Christiano, Lawrence and Davis, Joshua, Two Flaws in Business Cycle Accounting, Working Paper, Northwestern University, 2008
- Christiano, Lawrence, Motto, Roberto, and Rostagno, Massimo, Financial Factors in Business Cycles, working paper, Northwestern University, 2009

- Covas, Francisco, and den Haan, Wouter, The Cyclical Behavior of Debt and Equity Finance, *American Economic Review*, 2009
- Crouzet, Nicolas, Corporate Debt Structure and the Macroeconomy, working paper, Columbia University, 2014
- De Fiore, Fiorella, Teles, Pedro and Tristani, Oreste, Monetary Policy and the Financing of Firms, *American Economic Journal: Macroeconomics*, 2011
- Di Tella, Sebastian Uncertainty Shocks and Balance Sheet Recessions, Working Paper, MIT, 2012
- Gertler, Mark and Peter Karadi, A Model of Unconventional Monetary Policy, *Journal of Monetary Economics*, 2011
- Gertler, Mark and Nobuhiro Kiyotaki, Bank Liquidity and Bank Runs in an Infinite Horizon Economy, Working Paper, Princeton University, 2013
- Gilchrist, Simon, Sim, Jae and Zakrajsek, Egon, Uncertainty, Financial Frictions, and Investment Dynamics, Working Paper, Boston University, 2013
- Gilchrist, Simon, and Zakrajsek, Egon, Credit Spreads and Business Cycle Fluctuations, *American Economic Review*, 2012
- Gomes, João, Amir Yaron and Lu Zhang, Asset Prices and Business Cycles with Costly External Finance, *Review of Economic Dynamics* 2003
- Goodfriend, Marvin and McCallum, Bennett, Banking and Interest Rates in Monetary Policy: A Quantitative Exploration, *Journal of Monetary Economics*, 2008
- Gourio, Francois, Credit Risk and Disaster Risk, *American Economic Journal: Macroeconomics*, 2013
- Hall, Robert, Quantifying the Forces Leading to the Collapse of GDP after the Financial Crisis, Working Paper, Stanford University, 2012
- Kang, Johnny and Pflueger, Carolin, Inflation Risk in Corporate Bonds, *Journal of Finance*, 2013
- Khan, Aubhik and Julia K. Thomas, Credit Shocks and Aggregate Fluctuations in an Economy with Production Heterogeneity, *Journal of Political Economy*, 2014
- Kiyotaki, Nobuhiro and John Moore, Credit Cycles, *Journal of Political Economy*, 1999
- Krishnamurthy, Arvind, and Zhiguo He, Intermediary Asset Pricing, *American Economic Review*, 2013
- Miao, Jianjun, and Pengfei Wang, Credit Risk and Business Cycles, Working Paper, Boston University, 2010
- Nguyen, Thien, Bank Capital Requirements: A Quantitative Analysis, Working Paper, Wharton School, 2014
- Phillipon, Thomas, Has the U.S. Finance Industry Become Less Efficient? Working Paper, NYU, 2013
- Ward, Colin, Is the IT Revolution Over? An Asset Pricing View, Working Paper, Wharton School 2013

## **GRADES**

### **Homeworks 50%**

There will be 5 or 6 homeworks. They emphasize serious computational work and should be done in teams of 2 students.

### **Paper Presentations 50%**

Every week I will assign two or three recent papers for possible. Everyone is expected to prepare brief 5 slide/10 minute summary presentation of **each** paper. I will randomly select a student to present in class and will we have a brief general discussion about the paper after each presentation.

**Homeworks and presentation should be submitted on Canvas before each class starts.**

**There is no final exam or midterm.**