SHIV NADAR UNIVERSITY
DELHI NCR

CENTRE FOR ECONOMICS, MATHEMATICS & DATA ANALYTICS

Undergraduate Prospectus 2020-21
B.Sc. (Research) in Economics and Finance

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Centre for Economics, Mathematics & Data Analytics at SNU

Shiv Nadar University was established in the year 2011 with the aim of creating "an enduring, research-led, inter-disciplinary university". In order to promote the inter-disciplinary focus of the university, the Centre for Economics, Mathematics & Data Analytics came into being. The Centre brings together the disciplines of mathematics, economics, finance, and computer science to pursue knowledge and increase social welfare. These disciplines are beginning to overlap more and more, and are also jointly moving to a more fundamental position in humanity's quest for knowledge. Hence, under the ambit of Centre for Economics, Mathematics & Data Analytics, the Department of Economics (School of Humanities & Social Sciences) and Department of Finance Accounting & Control (School of Management & Entrepreneurship) has taken the lead to jointly offer the first ever inter-disciplinary program at Shiv Nadar University aimed at these disciplines.

Established in 2012, the Department of Economics at Shiv Nadar University is one of the premier Economics departments in India. The department is comprised of faculty who have an active research agenda in various sub-disciplines in economics including economic theory, macroeconomics, development economics, environmental economics, international trade, labour economics, health economics, public economics and finance.

Established in 2014, the Department of Finance, Accounting & Control is a part of School of Management & Entrepreneurship. It has been built painstakingly from the ground up – recruiting both established and high potential faculty from top educational institutions; investing in the latest educational technology and infrastructure. SME has tie-ups with leading international institutions such as Babson College, University of Warwick, & Peking University.

The Undergraduate Major in Economics and Finance

The curriculum of the analytically, and quantitatively focussed undergraduate program in Economics & Finance is designed to provide the students with a broad and deep understanding of forces that influence markets and institutions in general, and financial markets and financial institutions in particular. The curriculum balances rigorous economic and finance theory with an exhaustive quantitative focus that will enable the students to translate theory to practice. In order to develop the necessary analytical and quantitative skills, in addition to courses in economics and finance, students will also take courses in mathematics, and statistics. The undergraduate program will provide them with the tools that underpin both the theoretical and

quantitative aspects of economics and finance. Additionally, students will take up a course in computing for the purpose of practical applicability; a course in academic writing with the aim of developing effective written communication; and a research seminar that will give the students first-hand research experience. The programme will culminate in a semester-long internship in the final semester, or a research thesis (subject to mutual agreement between the student and a faculty advisor). At the end of the program, the student will have the analytical ability, technological expertise, and theoretical knowledge as well as the quantitative aptitude and practical knowledge of a trained economist and finance professional. This will provide students with a platform to pursue, according to their own interest, a wide range of career paths including financial services, analytics, banks, consulting, policy institutes, regulatory bodies, think tanks, and higher education, amongst others.

Programme structure:

To graduate with a Major in Economics and Finance, each student needs to obtain at least 155 credits, of which at least 113 credits must be obtaned from the Major courses and 42 credits must be obtained from the UWE (University-wide-elective) and CCC (Common-course-curriculum) courses.

The 113 credits that must be obtained from the Major courses includes compulsory core courses (77 credits), elective courses in Economics and Finance (24 credits) and one semester-long internship (12 credits). Compulsory courses are split between Economics and Finance core courses (54 credits cumulatively), Academic Writing (4 credits, offered by the Department of English), Calculus, Probability, Statistics, and Computer Programming (16 credits cumulatively, offered by the Department of Mathematics), and a Research Seminar (3 credits). Elective courses are split between Economics, and Finance courses (24 credits cumulatively) out of which a student must obtain at least six credits each in elective courses offered by the Department of Economics and the Department of Finance, Accounting and Control. The program culminates with a semester long Internship (scheduled in the eight semester, carrying 12 credits). The student may opt for a research thesis in lieu of the internship, subject to a mutual agreement between the student and a faculty thesis advisor.

The student must obtain least 42 credits from UWE and CCC courses. The students are encouraged to develop technological expertise through departmental and university-wide electives. For more details, please refer to the UG students' handbook of the university at https://snu.edu.in/sites/default/files/Student-Handbook-2021.pdf. A student must complete all requirements for a **degree in a minimum of three years and a maximum of six years.**

Programme Learning Outcomes:

After completion of the course

1. students will be able to understand and analyse the economic forces that influence a particular situation
2. students will have an in-depth knowledge about the functioning of various financial markets such as bond market, stock markets, futures markets, money markets, commodity derivative markets, etc.;
3. students will be able to summarize and analyse financial and macroeconomic data to find answers to real-world problems by using their programming skills to implement the relevant statistical and econometric tools
4. students will be conversant with financial theories about firms decision making process and how firms communicates with outsiders;
5. students will have deep understanding of the optimization tools, and will be able to apply these tools to solve problems in economics and finance

Coursework and Credits Overview

Courses	Typical timeline	Credits
Core Courses in Economics and Finance: Foundation Courses *Intensive courses in Economics and Finance that builds basic understanding and theoretical foundation.*	Semester 1-6	54 Credits (cumulative)
Academic Writing *Generally Offered by Department of English*	Semester 1	4 Credits
Calculus I, Probability, & Statistics *Generally Offered by Department of Mathematics*	Semester 1-3	12 Credits (cumulative)
Introduction to Computing and Programming *Generally Offered by Department of Mathematics or CSE*	Semester 3	4 Credits
Departmental Elective Courses *Selected from a range of course offerings covering diverse areas and sub-fields* *Students must take at least 2 electives in Economics and 2 electives in Finance courses. Students are free to choose the composition of the remaining electives.*	Semesters 4-7	24 Credits (cumulative)
Research Seminar	Semester 7	3 Credits
Internship (or Research Thesis)	Semester 8	12 Credits

*The remaining credits must be obtained from UWEs and CCCs as per University norms. Please see Undergraduate Handbook for more information on UWEs and CCCs on the following link - http://snu.edu.in/pdf/UG-Handbook-2018.pdf

An Example of a Semester-wise Schedule

1st Year	**Semester 1** 1. Academic Writing 2. Calculus I 3. Logic & Scientific Reasoning 4. Introduction to Financial Accounting 5. Principles of Microeconomics 6. UWE/CCC	**Semester 2** 1. Management and Cost Accounting 2. Principles of Macroeconomics 3. Intermediate Microeconomics 4. Probability 5. UWE/CCC
2nd Year	**Semester 3** 1. Corporate Finance 2. Game Theory 3. Intermediate Macroeconomics 4. Introduction to Computing and Programming 5. Statistics 6. UWE/CCC	**Semester 4** 1. Investment Analysis and Portfolio Management 2. Financial Markets and Institutions 3. Introductory Econometrics 4. Departmental Elective I 5. UWE/CCC
3rd Year	**Semester 5** 1. Financial Econometrics 2. Options, Futures and Derivatives 3. Departmental Elective II 4. UWE/CCC	**Semester 6** 1. FinTech 2. Departmental Elective III **3.** Departmental Elective IV **4.** UWE/CCC
4th Year	**Semester 7** 1. Research Seminar 2. Departmental Elective V 3. Departmental Elective VI 4. Departmental Elective VII 5. UWE/CCC	**Semester 8** Internship (12 credits)

COURSE DESCRIPTIONS

Each course is conducted through lecture, tutorial and practical hours indicated as (L:T:P) at the end of the course descriptions below.[1]

GENERAL COURSES

Academic Writing
This is a course in critical reading, critical thinking and critical writing. You will read a selection of essays and learn to write a 5-page academic paper that makes an argument by constructing evidence from the readings discussed in class. This is a writing intensive class. You will write 5 papers in 2 drafts each, so 10 papers in all. Expect to be either writing or revising a draft every single week of the semester. This is a workshop style course where the course will run on your constant class participation in discussions, peer reviews and group work. The readings will include among others, essays by: Ruth Vanita "Was Sita Mrs. Ram?": Sunil Kumar "Naming"; Derek Jenson "Silence", Alain de Botton "Transmission Engineering": Emily Martin "The Egg and Sperm". **(3:1:0)**

Calculus I
This course covers one variable calculus and applications. It forms the base for subsequent courses in advanced vector calculus and real analysis as well as for applications in probability, differential equations, optimization, etc. One of the themes of the course is to bring more rigour to the formulas and techniques students may have learned in school. **(3:1:0)**

Introduction to Computing and Programming/Computing:
This course aims to empower the students in data abstraction, algorithm design and performance estimation. In the process they shall learn the art of programming – a pretty useful skill to have! Programming in C and Matlab will be taught. **(3:0:1)**

Probability
Probability is the means by which we model the inherent randomness of natural phenomena. This course introduces you to a range of techniques for understanding randomness and variability, and for understanding relationships between quantities. This course is a prerequisite for later courses in Statistics, Stochastic Processes and Mathematical Finance. **(3:1:0)**

Statistics
This course is designed to teach learners beginning and intermediate concepts of statistical analysis using the Python programming language. Students will learn – where data come from, what types of data can be collected, study data design, data management, and how to effectively carry out data exploration and visualization. They will be able to utilize data for estimation and assessing theories, construct confidence intervals, interpret inferential results, and apply more advanced statistical modelling procedures. Finally, they will learn

[1] The prerequisites and the elective courses are revised from time to time. Please contact the UG Adviser for further information.

the importance of and be able to connect research questions to the statistical and data analysis methods taught to them**. (3:0:1)**

Research Seminar
This course is designed to stimulate students to think deeply about a research question of their interest. The seminar will give students a first-hand experience of how to formulate a research question, what the appropriate research methodology might be, and finally, how to communicate the research question, methodology and finding in a manner that is accessible to the target audience. The course will also expose students to marquee theoretical and empirical research papers in finance and economics. The skills acquired in this course will be invaluable in the almost any career path a student might want to pursue. **(3:0:0)**

ECONOMICS CORE COURSES

Principles of Microeconomics
This course is an introductory undergraduate course that teaches the fundamentals of microeconomics. It is designed to provide a foundation for economic analysis and a broad understanding of the economic issues at micro level. This course begins with a discussion of supply and demand and the basic forces that determine an equilibrium in a market economy. Next, it introduces a framework for learning about consumer behaviour and analysing consumer decisions. We then turn our attention to firms and their decisions about optimal production, and the impact of different market structures on firms' behaviour. The final section of the course provides an introduction to some of the more advanced topics like the notion of efficiency and optimality from a society's point of view and a brief discussion of welfare theorems. **(3:1:0)**

Principles of Macroeconomics
This course introduces the main theories explaining the aggregate (or macro) behaviour of the economy. The course starts by discussing how key macro variables are measured before turning to theories that explain the behaviour of the economy in the short and long run. Using this foundation, we discuss the main tools of macroeconomic policy (monetary and fiscal policy) and their role in stabilising the economy. We conclude by exploring the uses of macro policy in economies with international trade and turbulent financial markets. **(3:1:0)**

Logic and Scientific Reasoning
This is an introduction to mathematical logic and scientific methods that provides an analytical foundation. The course begins with an introduction to elements of logic and deductive method and will mostly emphasize on theory of sentential calculus, identity, relations and deductive methods. Finally, applications of logic are presented towards a construction of mathematical theory. **(3:1:0)**

Introductory Econometrics
This course introduces the basics of the practice of modern econometric techniques. A

detailed discussion of the linear regression model will be presented. The topics included in the course are: the simple regression model, multiple regression models, classical assumptions about disturbances, hypothesis testing, violation of classical assumptions, multicollinearity, heteroskedasticity, omitted variable bias, functional forms, dummy variables, outliers, goodness of fit and instrumental variables. To complete some assignments and the project the students will also be introduced to STATA, statistical analysis software. **(3:1:0)**

Game Theory

This course is an introduction to non-cooperative game theory – static and dynamic games of complete and incomplete information. The aim of the course is to provide students with a critical understanding of the scenarios wherein the tools and techniques of game theory may be used. We will study the basic concepts of Nash Equilibrium, Correlated Equilibrium, Dominance & rationalisability, Sub Game perfection and Bayesian Equilibrium. Practical applications of these concepts will be studied in the context of repeated games, bargaining and auction problems, signalling and cheap talk games. **(3:1:0)**

Intermediate Microeconomics

This course is intended to provide advanced tools and techniques in the spheres of consumer theory, markets, and general equilibrium and builds on the introductory microeconomics course ECO 101. Students will be rigorously taught how consumers maximize their preferences given their budgets to make optimal consumption decisions, which in turn are aggregated to form the industry demand. Again, firms choose technology and employ resources optimally to minimize costs, which give rise to the industry supply function. The industry demand and supply then interact in the context of different market structures (perfect competition, monopoly, oligopoly, etc.) to determine market price and quantity in equilibrium, which give rise to consumer and producer surplus. The government may impose taxes or provide subsidies to alter these surpluses. Finally, general equilibrium analysis is invoked to analyse the behaviour of multiple markets at the same time, and how a change in one affects the other. **(3:1:0)**

Intermediate Macroeconomics

This course is a continuation of the concepts introduced in the introductory macroeconomics course ECO 102 and discusses the facts and theories about the determination of per capita income and its differences across countries and across time. In particular, it includes the study of economic fluctuations in output and employment and the role of government in influencing these aggregate variables through its monetary and fiscal policies. A range of macroeconomic problems are analysed from government finances in the intermediate run to economic stability in the short run. The course equips the students to use tools of macroeconomics to study various macroeconomic models and macroeconomic policies in-depth. **(3:1:0)**

Financial Econometrics

This is an advanced undergraduate econometrics course for those who want to go deeper into econometric theory and its applications, continuing with the concepts developed in ECO 203. Topics covered will include instrumental variables, panel data methods, difference-in-difference techniques, limited dependent variable methods and experimental

methods. Students will be required to be familiar with and use various econometric software. After completing the course, the students should be able to handle large microdata and work independently on empirical research projects. **(3:1:0)**

FINANCE CORE COURSES

Introduction to Financial Accounting
This is an introductory course intended to provide strong foundation on financial accounting. Starting with a discussion on preparing journal entries it takes the candidates through the complete accounting cycle that includes preparation of ledger, trial balance, income statement & balance sheet and cash flow statement. At the end, students will try their hand in analysing financial statements through financial ratios. This course will serve as an essential for those who are interested in a career in accounting and auditing. The pedagogy will consist of regular class exercises, short cases and student discussions on select topics of interest. **(3:0:0)**

Corporate Finance
This is an introductory course, which will acquaint students to fundamental concepts of finance. The focus of this course will be on financial theory, which assist managers in designing corporate policy and making decisions. The objective is to familiarize participants with the three major decision areas of corporate finance, viz. the investments, financing and dividend decisions. The course presents a comprehensive and detailed treatment of the theories, applications, and financial tools used in a corporate financial environment. **(4:0:0)**

Financial Markets & Institutions
This course will introduce students to the Indian Financial Markets make-up and structure. The course will start with an evaluation of the institutions, instruments, and participants involved in the industry. The mainstream markets to be evaluated includes the equity market, money market, bond markets, etc. **(3:0:0)**

Management and Cost Accounting
This course introduces students to various cost concepts and tools that help managers in decision-making, planning and control of business operations. Major topics include cost-volume-profit analysis, job, process and batch costing, joint product and by-product costing, standard costing & budgets and evaluating discrepancies in the form of variance analysis. By the end of the course, students will be able to work on product / service pricing, outsourcing decisions, examine cost structures of various organisational divisions, prepare budget, and evaluate for performance appraisal. **(3:0:0)**

Investment Analysis and Portfolio Management
This course focuses on introducing the students the various aspects of securities analysis and portfolio management. The focus will be on the tools and techniques that help the managers in managing their portfolio. The objective of the course is to introduce the students to contemporary theories and practice of security analysis and investments. Topics will include bond and stock valuation, portfolio theory, risk management (options,

futures, and immunisation), investment ethics, and performance evaluation. A hands-on group project evaluating the stock of a listed Indian company will be an integral part of the course. **(3:0:0)**

Options, Futures & Derivatives

The objective of this course is to introduce the students to concepts and models underlying the pricing of various options, futures & derivatives. The course covers theoretical understanding of the derivatives as well as technical tools that will enable them in conversing with derivative professionals. **(3:0:0)**

FinTech

In this course, participants will be exposed to technology-driven financial technologies, to understand the complex structure of payment methods and financial regulations. The course will also help participants in developing a framework to understand blockchain technology in cryptocurrency. The course will cover topics such as robo-advising, and crowdfunding and how an investor can achieve better returns using these technologies. By the end of this course, participants will be able to identify emerging technologies in Financial Technologies and its impact in the future of finance and investments. **(3:0:0)**

DEPARTMENTAL *ELECTIVES*

The following list is indicative in nature and non-exhaustive, and not all but a selection of electives is offered every year.

Economics:

1. History of Economic thought
2. Law and Economics
3. Time Series and Forecasting
4. Indian Economic History
5. Health Economics
6. Introductory Financial Economics
7. Public Economics
8. International Finance
9. Labour Economics
10. Introductory Environmental Economics
11. Advanced Macroeconomics
12. Advanced Microeconomics
13. Advanced Econometrics
14. Contract Theory and Institutions:
15. Economic Development
16. Money and Banking
17. Economics and Politics
18. Industrial Organization
19. Financial Economics and Asset Pricing
20. International Economics
21. Global Economy
22. Topics in Environmental Economics
23. Topics in Macroeconomics

Finance

1. Corporate Valuation and Financial Modelling
2. Merchant Banking and Financial Services
3. Corporate Financial Reporting & Analysis
4. Advanced Corporate Finance
5. Financial Frauds
6. Corporate Taxation including GST
7. Capital Markets
8. Introduction to Mathematical Finance
9. Spreadsheet modelling in Finance
10. Insurance

The courses are reviewed periodically based on the requirement of the program and are subjected to changes.

ELIGIBILITY

Students from all backgrounds are encouraged to apply for the BSc (Research) in Economics and Finance. However, students must have taken Mathematics up to Class XII to be eligible for the selection process to this programme. Detailed information about the admission process can be found at the Admissions webpage of the university: https://www.snuadmissions.com/