



King Saud University
Deanship of Graduate Studies
College of Business Administration
Council of Graduate Programs in Business Administration

Ph.D. in Business Administration Program

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Ph.D. in Business Administration

INTRODUCTION

King Saud University has been a pioneer in serving the Saudi Community, and has spearheaded the introduction of graduate programs in science and humanities in the Kingdom, at both Master and Doctorate levels. The university has chosen the right track by initiating a distinguished and carefully orchestrated Master in Business Administration Program (MBA) at the start of the academic year 1992/1993 (1413/1414 A.H.). The master program has a very good reputation, and its graduates are occupying excellent work positions in the Kingdom. It now seems as the right time for the university to take the necessary steps to initiate a Ph.D. program in Business Administration, as the first program of its kind in the Kingdom and in the whole Arab peninsula.

The program is expected to fill a dire need and to fill a long-lived gap where it:

- Offers an opportunity for master degree holders from King Saud University or from other accredited universities, inside and outside the Kingdom, who are willing to continue with their Ph.D. study.
- Meets the needs of public and private sectors for highly qualified individuals.
- Utilizes and directs the available resources within and outside the university, towards scientific research purposes and promotes research skills of the participants.

The aim of the program is to train and prepare male and female students, with skills and personal readiness to fill teaching and research positions in the universities, institutions, research centers in Saudi Arabia and other Arab countries.

In addition to fill leading posts in the business sector, the program aims at promoting participants' abilities to develop business techniques and methods within the specializations in the program and sharing the results of their research with others.

The program pays special attention to the capable individuals expected to contribute effectively towards promoting and developing various business fields, in the academic research inside the universities, research institutions and units, and leading positions in the government agencies and the private sector.

PROGRAM GOALS

1. Educate excellent scholars and provide business departments at Saudi and other Arab universities with qualified teaching staff.
2. Elevate research quality and academic studies in business-related fields, with special focus on the Saudi market. This will be made possible by the central position of scientific research in the PhD program. Students conduct subject-related research in addition to their participation in the analysis and discussion of the latest scientific developments in the field at symposiums and workshops, in addition to their active involvement in the research activities of their supervisors.

3. Enhance the managerial skills of businessmen who join the Ph.D. program, linking them to the theoretical and scientific foundations of business administration.

Degree

The degree offered is Doctor of Philosophy in Business Administration (Ph.D.) as follows:

- Ph.D. in Business Administration with a major in Management.
- Ph.D. in Business Administration with a major in Marketing.
- Ph.D. in Business Administration with a major in Finance.

ADMISSION REQUIREMENTS

1. Have a bachelor degree from King Saud University or equivalent, in one of the following specializations:
 - a) Marketing, finance, organizational behavior, human resources, operations management, management information system, international business, hospital administration, insurance, and other specializations in business administration.
 - b) Specializations other than business administration are evaluated on a case by case basis.
2. Have a Master of Business Administration (MBA) from King Saud University or equivalent with a GPA of at least (4) out of (5) or equivalent.
3. Score a minimum of 80 in the iBT Toefl (550 paper-based test) or Band 6.5 in the IELTS. Graduates of master programs from accredited universalities, where English had been the medium of instruction, may be exempted from the TOEFL requirement, provided that not more than five years have elapsed since their graduation.
4. Submit GMAT score.
5. Pass the Interview.

PH.D. PROGRAM OVERVIEW

The program includes three fields of specialization; Management, Marketing, and Finance. Program details as follows:

1. Passing of prerequisite courses, if any.
2. Passing 36 hours of coursework as follows:
 - a. Fifteen (15) Units of research skills and statistical analysis courses.
 - b. Fifteen (15) Units of core courses.
 - c. Six (6) Units of supporting courses.
3. Passing the comprehensive examination, which consists of two parts: written and oral, with the written exam taken first, and both are on the field of specialization.
4. Successful completion of the PhD dissertation.

PROGRAM COURSES

The required courses for the PhD program in Business Administration are:

1. Prerequisites, according to an applicant's background, if any.

2. PhD courses: includes 36 units as follows:
 - A. Research Skills and Statistical Analysis: 15 units.
 - B. Compusary Core Courses: 15 units.
 - C. Electives as Supporting Courses: 6 units.

(A). Research Skills and Statistical Analysis Courses

To empower the student to conduct scientific research in the field of business administration, it is vital for the student to have an understanding of economic theory, foundations of behavioral sciences and research and statistical methods. In order to acquire the necessary research skills and statistical analysis, the student should successfully pass 15 Units of the following courses:

Code	Course	Units
BA 601	Theory Development in Business Administration	3
BA 698	Seminar in Advanced Research Design	3
ECON 606	Advanced Economic Analysis	3
QUA 608	Advanced Business Statistics (Management & Marketing majors)	3
ECON 608	Econometrics (Finance majors)	
QUA 609	Applied Multivariate Analysis (Management & Marketing majors)	3
ECON 609	Financial Econometrics (Finance majors)	
Total Hours		18

(B). Major Courses

Management Program

- (a). Major courses

All students in the Management program must take and pass 15 Units of core courses as follows:

Core Courses for Management Majors

Code	Course	Units
MGT 611	Organization Theory	3
MGT 613	Advanced Organizational Behavior	3
MGT 614	Seminar in Human Resources Management	3
MGT 616	Seminar in Strategic Management	3
MGT 630	Current Issues in Management	3
Total Units		15

- (b). Supporting courses

Student should choose, with the advisor's consent, at least 6 Units of the following courses:

Supporting Courses for Management Majors

Code	Course	Units
MGT 618	Leadership in Organizations	3
MGT 620	Total Quality Management	3
MGT 622	Corporate Governance	3
MGT 624	Decision-Making Theory	3
MGT 626	Organizational Change and Development	3
QUA 611	Applied Nonparametric Statistics	3

Marketing Program

(a). Major courses

All students in the Marketing program must take and pass 15 Units of core courses as follows:

Core Courses for Marketing Majors

Code	Course	Units
MKT 611	Advanced Consumer Behavior	3
MKT 613	Seminar in Marketing Theory	3
MKT 614	Marketing Research	3
MKT 616	Seminar in Marketing Channels	3
MKT 630	Current Issues in Marketing	3
Total Units		15

(b). Supporting courses

Student should choose, with the advisor's consent, at least 6 Units of the following courses:

Supporting Courses for Marketing Majors

Code	Course	Units
MKT 618	Product Management	3
MKT 620	Integrated Marketing Communications	3
MKT 622	Global Marketing	3
MKT 624	Services Marketing	3
MGT 622	Corporate Governance	3
QUA 611	Applied Nonparametric Statistics	3

Finance Program

(a). Major courses

All students in the Marketing program must take and pass 15 Units of core courses as follows:

Core Courses for Finance Majors

Code	Course	Units
FIN 611	Theory of Finance	3
FIN 613	Financial Derivatives and Risk	3
FIN 614	Seminar in Corporate Finance	3
FIN 616	Seminar in Investment	3
FIN 630	Current Issues in Finance	3
Total Units		15

(b). Supporting courses

Student should choose, with the advisor's consent, at least 6 Units of the following courses:

Supporting Courses for Finance Majors

Code	Course	Units
FIN 618	Behavioral Finance	3
FIN 620	Asset Valuation	3
FIN 622	International Financial Management	3
MGT 622	Corporate Governance	3
QUA 609	Applied Multivariate Analysis	3
QUA 611	Applied Nonparametric Statistics	3

THE COMPREHENSIVE EXAMINATION

Upon successful completion of the required courses and obtaining at least a class of "very good", students are required to sit for and pass a comprehensive examination. This comprehensive examination is scheduled and administered by a committee selected by the Council of Graduate Programs in Business Administration and in accordance with the graduate studies regulations. The examination consists of two parts, a written first part, and an oral second one. Both, however, comprises the specialization field of the student. The student moves to candidacy status upon passing the two parts, otherwise he/she is subjected to the graduate studies regulations.

THE DISSERTATION

After passing the comprehensive examination, the student registers his/her dissertation in one of the specialization fields of the program, under BUS 700 (Management), MKT 700 (Marketing), or FIN 700 (Finance).

Summary of the Ph.D. in Business Administration Program

Stage	Requirements
Stage (1): Courses	<ul style="list-style-type: none"> ▪ PREREQUISITES: 15 Units, subject to increase on the program recommendation, that has to be completed before starting the Ph.D. courses. Students must make up for any unfulfilled prerequisites at King Saud University. ▪ PROGRAM COURSES: 36 Units consist of: <ul style="list-style-type: none"> ○ Statistical analysis and research skills: 15 Units ○ Core courses: 15 Units ○ Supporting courses: 6 hours.
Stage (2): Comprehensive Examination	Includes two parts: written and oral, both are in the major area.
Stage (3): Dissertation	To be completed in not less than four semesters but not more than six semesters (see Graduate Studies Bulletin).

Model Schedule for Management Majors

Semester (1)		Hrs	Semester (2)		Hrs
BA 601	Theory Development in Business Administration	3	MGT 611	Organizational Theory	3
ECON 606	Advanced Economic Analysis	3	MGT 613	Advanced Organizational Behavior	3
QUA 608	Advanced Business Statistics	3	QUA 609	Applied Multivariate Analysis	3
Total Hours		9	Total Hours		9

Semester (3)		Hrs	Semester (4)		Hrs
MGT 614	Seminar in HRM	3	MGT 630	Current Issues in Management	3
MGT 616	Seminar in Strategic Management	3	BA 698	Seminar in Advanced Research Design	3
	Supporting course	3		Supporting course	3
Total Hours		9	Total Hours		9

Semester (5)		
MGT 700	Comprehensive Exam Research Proposal Preparation	

Model Schedule for Marketing Majors

Semester (1)		Hrs	Semester (2)		Hrs
BA 601	Theory Development in Business Administration	3	MKT 611	Advanced Consumer Behavior	3
ECON 606	Advanced Economic Analysis	3	MKT 613	Seminar in Marketing Theory	3
QUA 608	Advanced Business Statistics	3	QUA 609	Applied Multivariate Analysis	3
Total Hours		9	Total Hours		9

Semester (3)		Hrs	Semester (4)		Hrs
MKT 614	Marketing Research	3	MKT 630	Current Issues in Marketing	3
MKT 616	Seminar in Marketing Channels	3	BA 698	Seminar in Advanced Research Design	3
	Supporting course	3		Supporting course	3
Total Hours		9	Total Hours		9

Semester (5)		
	Comprehensive Exam	
MKT 700	Research Proposal Preparation	

Model Schedule for Finance Majors

Semester (1)		Hrs	Semester (2)		Hrs
BA 601	Theory Development in Business Administration	3	FIN 611	Theory of Finance	3
ECON 606	Advanced Economic Analysis	3	FIN 613	Financial Derivatives and Risk	3
ECON 608	Econometrics	3	ECON 609	Financial Econometrics	3
Total Hours		9	Total Hours		9

Semester (3)		Hrs	Semester (4)		Hrs
FIN 614	Seminar in Corporate Finance	3	FIN 630	Current Issues in Finance	3
FIN 616	Seminar in Investment	3	BA 698	Seminar in Advanced Research Design	3
	Supporting course	3		Supporting course	3
Total Hours		9	Total Hours		9

Semester (5)		
	Comprehensive Exam	
FIN 700	Research Proposal Preparation	

Program Course Description

BA 601 - Theory Development in Business Administration **3 (3+0)**

The effective use of epistemology in generating, defending and clarifying logically rigorous arguments is explored. Students from the diverse business disciplines will examine the processes which have guided theory development and theory testing. Attention will focus on what criteria are used to assess the adequacy of explanations and useful theories. Topics include philosophy of science, finding and formulating research problems and questions, literature reviews and searches, basic concepts in measurement, sampling, and qualitative and quantitative research methods and designs. During the course, each student is expected to prepare a research proposal/literature review. Prerequisite: BA 598.

BA 698 - Seminar in Advanced Research Design **3 (3+0)**

This course discusses advanced research techniques and designs and their applications to business problems, and contributes to developing the student's skills in preparing the dissertation proposal. The course objectives include developing the student's ability to: 1) acquire advanced research techniques in business administration, 2) identify a research area of interest, 3) conduct a literature review, 4) form research questions and operational hypotheses, 5) develop a research design, and 6) delineate a data analysis and interpretation plan. Prerequisite: BA 601.

MGT 611 - Organizational Theory **3 (3+0)**

The course centers on both psychological and sociological approaches to analyzing organizations, and emphasizes issues usually considered to be at the macro level of analysis such as organizational environment, structure, technology, power, as well as effectiveness. A critical review and analysis of contemporary theory and research on organization structure, process, and performance are conducted. In addition, topics related to reorganization and inter-organizational relationships are discussed. Opportunities are provided to the student to develop the necessary diagnostic and research skills required in organization studies. Prerequisite: BA 511.

MGT 613 – Advanced Organization Behavior **3 (3+0)**

The purpose of this course is to help students understand current research areas, identify research topics, formulate researchable problems in this field, and choose the appropriate research methods. It also encourages students to evaluate behavioral research and determine how well behavioral theories describe or explain real practices in organizations. Students participate in the critique of the methods used in outstanding current research, and in evaluating it in terms of underlying theory, hypotheses, measurements, data analysis, hypotheses testing, findings, and interpretation. Prerequisite: BA 511.

MGT 614 - Seminar in Human Resource Management **3 (3+0)**

This course focuses on contemporary research on human resource management as it relates to theories in organizational studies, sociology, and labor economics. The course analyzes these issues from both individual and organizational levels. Current research subjects in HRM are thoroughly discussed. Students participate in the critique of the methods used in outstanding current research, and in evaluating it in terms of underlying theory, hypotheses, measurements, data analysis, hypotheses testing, findings, and interpretation. Prerequisite: BA 512.

MGT 616 – Seminar in Strategic Management**3 (3+0)**

This course discusses the process of strategic management in large complex organizations and focuses on the structuring of strategic management and control process. Research is reviewed with regard to corporate objectives, evaluation of corporate strengths and weaknesses, the design of corporate planning systems, and corporate modeling. Management will be evaluated, including study of environmental scanning and incorporation of critical external factors in the planning process. Also, emphasis is placed on implementation of strategy and the mechanics of planning and control. Prerequisite: BA 597.

MGT 618 - Leadership in Organizations**3 (3+0)**

This course discusses several approaches to study leadership. It aims at showing the richness and complexity of the leadership theory and research. The course demonstrates the development of knowledge concerning leadership phenomena, and identifies the contribution of the trait, behavioral, contingency and neocharismatic paradigms and the result of empirical research on prevailing theories. Development of focused research problems, theory building, hypotheses formulations, research design and observation in leadership will be emphasized. Prerequisite: BA 511.

MGT 620 - Total Quality Management**3 (3+0)**

The course provides a comprehensive coverage of total quality management emphasizing the principles and practices of TQM, such as customer satisfaction, employee involvement, continuous improvement, supplier partnership, and performance measure, as well as the tools and techniques, such as statistical process control, quality systems, benchmarking, quality function deployment, experimental design, Tagushi's quality engineering, failure mode and effect analysis. The student analyzes and evaluates research studies conducted in this field.

MGT 622 – Corporate Governance**3 (3+0)**

Every business activity is affected by the issues of corporate governance and social responsibility. This course will examine how modern corporations are governed and to whom they should be responsible. The course will discuss the effects of legislation on corporate governance and examines both best practices and some of the high profile examples of companies that have been criticized because of poor corporate governance and lax policies that do not protect the interest of employees, customers, and the firms brand value. Consideration is also given to international comparisons of corporate governance structures and legal issues arising in contests for corporate control

MGT 624 - Decision Making Theory**3 (3+0)**

The purpose of this course is to analyze and critique research and theory on decision making around its three main streams: (1) descriptive – the use of decision theory to describe behavior, (2) normative - the use of the axiomatic theory to select axioms, and (3) prescriptive – the use of corrective techniques to improve decision making. Concepts, such as rational choice, expected utilities, and Bayes's theorem will be discussed. The course provides a comprehensive discussion of scientific inquiries and research in decision-making. Prerequisite: BA 511.

MGT 626 - Organizational Change and Development**3 (3+0)**

This course discusses assumptions, rationale, and theories of organizational change and development. The objective of the course is to enable students to study how organizations change and how managers direct the change process, and to identify the major factors involved in organizational change. The course illustrates the major techniques of organizational development, evaluates the effectiveness of organizational development programs, and discusses the potential cultural barriers to effective implementation of organizational development program. Prerequisite: BA 511.

MGT 630 - Current Issues in Management**3 (3+0)**

The main objective of this course is to discuss, analyze, and critique current management issues and problems, and to review emerging management literature and studies. The course gives special attention to human resources management, operations management, competitive strategies, and other topics not covered in other courses. Topics may vary from semester to semester according to the issues of importance at the time and according to the instructor.

MKT 611 - Advanced Consumer Behavior**3 (3+0)**

This course discusses the development of consumer behavior research, theories, and models, and evaluates this development from theoretical as well as practical perspectives. The course includes several readings and the student will be engaged in library research and class discussions presenting his critique of the state of the art and forming a position with regard to the topics discussed. Prerequisite: BA 541.

MKT 613 - Seminar in Marketing Theory**3 (3+0)**

This seminar addresses issues pertaining to theory development and testing in social research, deductive and inductive theory construction, models and modeling. The seminar also discusses the historical development of marketing thought and examines the contributions of early writers, which led to the establishment of marketing as an independent discipline. It considers the literature on modern marketing philosophy and its state of the art according to contemporary writers and researchers. The seminar includes several readings, which are analyzed, critiqued, and presented in class by the students. Prerequisites: BA 541.

MKT 614 - Marketing Research**3 (3+0)**

The purpose of this seminar is to expand the student's knowledge and skills beyond the mechanics of marketing research techniques and intelligence. This includes the application of research techniques to specific marketing problems such as new product introduction and advertising research. The student should be extensively trained to use advanced statistical applications in the areas of experimentation and multivariate analysis. During the course, the student is required to conduct case analyses and research projects. Prerequisites: BA 541, QUA 609.

MKT 616 – Seminar in Marketing Channels**3 (3+0)**

The purpose of this seminar is to discuss major research topics and new developments in the field of marketing channels and institutions. Classic and current channel articles will be discussed and emerging trends in channel research will be explored. Students will read, discuss, and critique assigned articles in the field. Prerequisite: BA 541.

MKT 618 – Product Management**3 (3+0)**

This course provides the student with the specialized knowledge, analysis, and assessment skills needed for product management. This includes the learning of how strategic product decisions are made and the use of the tools and techniques available in this field. Student assignments include product research reviews and critique. Case analysis and field experimentation are among the teaching techniques used. BA 541.

MKT 620 – Integrated Marketing Communications**3 (3+0)**

The course discusses communication theories and their applications to marketing. It focuses on the review and critique of studies related to the behavioral foundations of marketing communications, diffusion of innovations, persuasive communications, response-to-advertising models, positioning strategies, advertising effectiveness, message appeal, media strategies, and other recent trends in

marketing communications research. Students review and discuss research conducted in this field. BA 541.

MKT 622 - Global Marketing

3 (3+0)

The main objective of the course is to discuss, analyze, and critique research pertaining to global marketing activities. Topics include theories of foreign trade, international marketing strategies, and international marketing research and information systems. In addition, the course discusses a number of contemporary issues such as standardization versus adaptation, cultural, social, competitive, economic, legislative, and political factors influencing global marketing, non-traditional exports and the impact of the World Trade Organization on the economies of developing countries, with a particular reference to Saudi Arabia. Prerequisite: BA 541.

MKT 624 - Service Marketing

3 (3+0)

The purpose of this seminar is to discuss major research topics and new developments in services. Classic and current service articles will be reviewed and emerging ideas in service research will be explored. As reviews and discussions proceed, the seminar allows the students to develop research ideas, proposals, and papers related to services research. BA 541.

MKT 630 - Current Issues in Marketing

3 (3+0)

The main objective of this course is to discuss, analyze, and critique current marketing issues and problems, and to review emerging marketing studies in all marketing fields. The course gives special attention to global marketing issues and how modern and emerging marketing techniques and tools can be applied to the Saudi environment. Topics may vary from semester to semester according to the issues of importance at the time and according to the instructor.

FIN 611 - Theory of Finance

3 (3+0)

This course covers a wide range of topics in theoretical corporate finance. Topics include tax approach to explain corporate financial decisions, agency conflicts in the firm, asymmetric information, optimal financial contracting, the market for corporate control, the signaling theory and asset pricing applications to corporate finance among others, The primary focus is on how asymmetric information, agency conflicts, strategic interactions, and incomplete contracting affect corporate financial decision-making. The course aims both to familiarize students with influential papers and current research, and to promote new research ideas in the area. BA 521.

FIN 613 - Financial Derivatives and Risk

3 (3+0)

The course explores different aspects of financial risk management using derivatives including futures, swaps, and option contracts. Emphasis is given to pricing models including arbitrage pricing theory, risk-neutral valuation, and the pricing models since Black- Scholes model for stock options. Topics Include futures and swap pricing, American- type option pricing, hedging and speculation using derivatives, dynamic hedging strategies and portfolio insurance. Students Analyze and evaluate research studies conducted in this field. BA 521.

FIN 614 - Seminar in Corporate Finance

3 (3+0)

This course aims at introducing the students to academic research in corporate finance. The emphasis is on theoretical research that studies the firm's choice of its capital structure and dividend policy in settings characterized by moral hazard and asymmetric information. Other areas covered in this course include, corporate control contests, mergers and acquisitions, initial public offerings, financial distress, and security design. The student analyzes and evaluates research studies conducted in this field. BA 521.

FIN 616 - Seminar in Investment**3 (3+0)**

The objective of this course is to study, analyze, and evaluate the theoretical and empirical work on investment analysis, asset pricing, and portfolio management. Topics include financial market micro-structure, market efficiency and documented anomalies, time-series properties of asset returns and cross-sectional properties of asset returns implied by equilibrium asset pricing models, such as CAPM, APT, and other factor models and consumption-based asset pricing. BA 521.

FIN 618 - Behavioral Finance**3 (3+0)**

This course is a survey of behavioral finance literature. It discusses the theory and evidence of the effect of behavioral biases on asset pricing. Topics include: Market inefficiency, documented anomalies, and proposed explanations to these anomalies such as: prospect theory, overconfidence, the attribution theory, the representative heuristic, and the availability heuristic. Finally, the course discusses the future of behavioral finance along with its unresolved issues. BA 521.

FIN 620 - Asset Valuation**3 (3+0)**

The course covers traditional valuation models and highlights their strengths and weaknesses. In addition to traditionally valued assets, Special attention is paid to the valuation of unconventional assets, financial service firms, start-ups, and private companies. Real applications will be an essential part of this course. BA 521.

FIN 622 - International Finance**3 (3+0)**

This course examines several advanced topics in international finance. The topics include theoretical models of determination of spot exchange rates as well as econometric tests of the models. The relation of forward rates to expected future spot rates and the nature of risk premiums in international asset pricing models are considered. Other topics covered include current developments relating to specific finance and international monetary problems, exchange risk management, foreign investment and trade financing, international capital markets integration and segmentation, and international financial systems. BA 521.

FIN 630 - Current Issues in Finance**3 (3+0)**

This course provides continuous update of the finance program curriculum. It reviews the evolving topics in the finance literature, and the ongoing research within the boundaries of corporate finance, investments, derivatives and asset pricing. Special attention is given to an overview of finance in the global marketplace and the growing role of social and institutional activism. Topics may vary from semester to semester according to the issues of importance at the time and according to the instructor.

ECON 606 - Advanced Economic Analysis**3 (3+0)**

This course covers in a wide extent topics related to micro-economic theory like Market Structures, Imperfect Competition, Game Theory, Oligopoly, Strategic Behavior, Welfare and General Equilibrium Theories, Risk and Uncertainty, and Externalities and Market Failures. It also discusses certain topics related to macro-economic theory such as Consumption, Investment and Unemployment, Monetary Policy, Inflation and Price Setting, Growth theories and Business Cycle Theories.

ECON 608 – Econometrics**3 (3+0)**

Topics that will be covered in this course include: estimation and inference in linear regression models; problems in regression models; heteroskedasticity; autocorrelation; instrumental variables; generalized method of moments; models with limited dependent variables, time series models; panel data models; simultaneous equation models.

ECON 609 - Financial Econometrics**3 (3+0)**

Topics covered in this course include: univariate time series modeling and forecasting in finance; multivariate models; VAR models; modeling long-run relationships; autoregressive conditional heteroskedasticity (ARCH) models; volatility and correlation; switching models; seasonalities in financial markets. Prerequisite: ECON 608.

QUA 608 - Advanced Business Statistics**3 (3+0)**

This course covers parametric and nonparametric statistics, intermediate and advanced statistics, and the review of descriptive statistics with applications using the statistical package SPSS. The contents will be more oriented toward practical applications, its use and interpretation, rather than mathematical derivation. Course topics include: role and purpose of statistics, descriptive statistics, summary measures for quantitative and qualitative data, data displays, modeling random behavior: elementary probability and some probability distribution models, normal distribution, statistical inference: confidence intervals and tests for means, variances, and proportions, linear regression analysis and inference, control charts for statistical quality control, introduction to experimental designs and ANOVA, simple factorial design and its analysis.

QUA 609 - Applied Multivariate Data Analysis**3 (3+0)**

This course is designed to provide students with knowledge of the concepts underlying multivariate techniques with an overview of actual applications in business. Topics covered include: review of matrix theory, univariate normal, t, chi-squared and F distributions, and multivariate normal distributions. Inference about multivariate means, Hotelling's T², multivariate analysis of variance, multivariate regression, and multivariate repeated measures. Inference about covariance structure, principal components, factor analysis, and canonical correlation. Multivariate classification techniques, discriminant and cluster analysis, measures of validity and reliability. Pre-requisite: QUA 608.

QUA 611 - Applied Nonparametric Statistics**3 (3+0)**

Theory and applications of various nonparametric statistical methods are covered for one-sample, two-sample, and multi-sample problems. Goodness of fit techniques such as Chi-square and the Kolmogorov-Smirnov test are covered along with graphical analysis based on P-P and Q-Q plots. Computer software such as MINITAB, SAS, SPSS, and STATXACT are used. Pre-requisite: QUA 608.