برنامج قسم الإحصاء

تأسس قسم الإحصاء في عام 1974م ، ومنذ ذلك التاريخ يمنح القسم درجة البكالوريوس في الإحصاء إضافة إلى تزويد طلبة الأقسام الأخرى بمقررات إحصائية تساند مقرراتهم الأساسية ، كذلك يمنح القسم درجة الماجستير في الإحصاء منذ عام 1987م .

وبناء على القرار رقم (982) لسنة 1981م الصادر من وزارة التعليم بشأن تنظيم لائحة الدراسات العليا في الجامعات الليبية بضرورة البدء في الدراسات العليا ، عليه فقد بدأ القسم في تنفيذ برنامج الدراسات العليا منذ عام (1989/1988م) وقد تم منذ ذلك الوقت وحتى فصل الخريف (2012/2011) تخرج اكثرمن (70) خريج .

تمنح درجة الإجازة العالية (الماجستير) في الإحصاء وفقاً للشروط التي تنص عليها اللائحة الداخلية للدارسات العليا بالكلية وبعد إنجاز الطالب (30) وحدة دراسية مقسمة على النحو التالي :

إن عدد الوحدات الدراسية المطلوبة في البرنامج هو 33 وحدة. من بينها 27 وحدة للمقررات الدراسية والمتبقي هو 6 وحدات دراسية تكون مخصصة لأطروحة الماجستير التي تعتمد علي عمل مشروع بحثي. المقررات الدراسية المطلوبة في البرنامج تنقسم أيضا إلي جزئيين هما:

(1) أربعة مقررات إجبارية تحمل (15 وحدة دراسية).

(2) أربعة مقررات اختيارية تحمل(9 وحدة دراسية)

(3) 6 وحدات دراسية للأطروحة ..

(1) المقررات الإجبارية 15 وحدة دراسية

ت	رقم	اسم المقرر	عدد الوحدات	المتطلبات
1	2501	نظرية الإحصاء	4	2414 . 2301
2	2502	الاستدلال الرياضي	4	2312 . 2313
3	2503	تحليل المتعدد المتغيرات	4	2411
4	2504	العمليات التصادفية	3	1302 .2415

(2) المقررات الاختيارية 9 وحدات دراسية من المقررات التالية

ت	رقم	اسم المقرر	عدد الوحدات	المتطلبات
1	2600	الإحصاء الحيوي*	3	-
2	2601	تصميم التجارب	3	2406
3	2602	نظرية المعاينة	3	2400
4	2603	نظرية اتخاذ القرار	3	2311 . 2312
5	2604	تحليل السلاسل الزمنية	3	2420 . 2504
6	2605	الاقتصاد القياسي	3	2205 . 2428
7	2606	نظرية الاحتمال	3	2402 .1306
8	2607	بحوث العمليات	3	2413
9	2608	تحليل السكاني	3	2401
10	2609	التنبؤ والتحكم	3	2406
11	2610	الإحصاء الطبي	3	2422
12	2611	التحليل الرياضي لعلمي الوراثة	3	2414 . 2428
13	2613	الانحدار اللإمعلمي	3	-

لطلاب الدراسات العليا بقسم الكيمياء و علوم الحياة.*

M.SC. PROGRAMS IN STATISTICS

The department of Statistics offers M.Sc. degree in statistics in accordance with the resolution No. 892 (1981) passed by the general people congress prescribing the by-laws for higher studies in the Libyan universities.

REQUIREMENT OF CREDIT HOURS WITH COURSE TITLE:

The number of credit hours required is 35. Out of these, 27 are in course work and the remaining 8 credit hours are on a dissertation based on a project work. The courses required for M.Sc. are again divided into two parts:

(a) Four compulsory courses carrying 15 credit hours, and

(b) Four elective courses carrying 12 credit hours.

Dissertation work may be started after cleaning the compulsory courses and the related elective courses. Details of the courses with their pre-requisites are given below:

(a) Compulsory Courses: 15 credit hours.

No	Course Code	Course Title	Credit hours	Prerequisite
1	2501	Theory of Statistics	4	2301-2414
2	2502	Statistical Inference	4	2312-2313
3	2503	Multivariate Analysis	4	2411
4	2504	Stochastic processes	3	2415-1302

(b) Elective Courses: 9 credit hours from the following:

No	Course Code	Course Title	Credit hours	Prerequisite
1	2600*	Bio-Statistics	3	--
2	2601	Experimental Design	3	2406
3	2602	Theory of Sampling	3	2400
4	2603	Decision Theory	3	2312 - 2311
5	2604	Time Series Analysis	3	2420 - 2504
6	2605	Econometrics	3	2205 - 2428
7	2606	Probability Theory	3	2402-1306
8	2607	Operations Research	3	2413
9	2608	Population Analysis	3	2401
10	2609	Prediction Forecasting and control	3	2406
11	2610	Medical Statistics	3	2422
12	2611	Mathematical Genetics	3	2414 - 2428
13	2613	Non-parametric regression	3	-

*** For M.Sc. students of Chemical and Biological sciences.**

Descriptions of Courses

2501 Theory of Statistics

Some probability distributions: Power series, Pareto, LogNormal, Cauchy, Weibull, Gumbel, Double exponential and logistic distributions. Compound distribution. Non-Central distributions: Non-central Chi-square, F, T and Beta distributions. Distribution of quadratic forms and Cochran's theorem. Order Statistics: Joint and marginal distribution of Order statistics, distribution of sample range, median, quintiles, maximum and minimum values. Asymptotic distribution of order statistics. Sequential methods: sequential probability ratio test, closed plans, operating characteristic function, average sample number function, sequential t - test, sequential estimation.

Non-parametric methods: review, derivative of some common non-parametric test statistics and their asymptotic behavior.

References:

(1) Johnson and Kolz: continuous univeriate distributions.V.I.II.

(2) Johnson and Kolz: Discrete distribution, Houghton Miffin company.

(3) Kendall and Stuart: The advanced theory of statistics V.2.

(4) Graybill: An introduction to linear statistical models, V.I, Mc Graw Hill.

(5) David: Order Statistics: John wily and Sons M.Y. 1970.

(6) Wald, I: Sequential analysis.

(7) Wetherill: Sequential methods in Statistics.

2502 Statistical Inference

Point Estimation: Properties of estimator: sufficiency, Neyman-Fisher's criteria for sufficiency, Minimal sufficiency, Exponential family, unbiasedness,uniformly minimum variance unbiased estimator, Cramer-Rao inequality and it's generalization, Fisher's information, Rao-Blackwell theorem, sufficiency and completeness, Lehmann-Sheffe theorem, Robust estimators, Estimation from truncated and censored distribution. The Baysian Approach: Use of prior density, Bayes estimators, Bayes estimators with mean square error, loss function, Admissibility.Minimax estimator. Other classes of estimators: Location invariant and scale invariant classes of estimators. Interval estimation: Confidence interval estimators, Pivotal methods, Baysian interval estimators and Fiducial interval estimators, central and non-central confidence interval. Methods of Estimation: Maximum Likelihood estimators and their properties including asymptotic properties, practical consideration in solving maximum likelihood equations and other methods. Hypotheses Testing: Most powerful test, Neymann-peasson lemma, asymptotic efficiency of a test, unbiased and similar test, UMP, UMPU and LUMPU test, similar regions, Neymann theorem, power curves, Likelihood ratio tests, asymptotes distribution of likelihood ratio statistics. Test of independence in multi-way contingency table.

References:

(1) Advanced theory of statistics, Vol II, Kendal and Stuart; Charles Griffin.

(2) Theory of statistical inference, Zacks.

(3) Linear statistical inference and it's applications, Rao.

(4) Statistical inference, Silvey, S.D, Penguin 1970.

(5) Comparative statistical inference, Bernett, V.D. Wiley 1973.

2503 Multivariate Analysis

Multivariate Normal Distribution and it's properties - A review; Maximum likelihood estimation of mean vector and covariance matrix of this distribution. Sampling distributions of simple correlation coefficient, Partial and multiple correlation coefficients, properties and uses; Hotelling's T2 - statistic and it's distribution, properties and uses; sample covariance matrix; Wishart distribution of estimates of mean vector and covariance matrix. General linear regression; estimation of parameters and test of hypotheses;Likelihood ratio test. Multivariate ANOVA: One-way and Two-way classification. Cluster analysis and classification; Discriminant function and related tests; distribution of characteristic roots of matrices; canonical correlation analysis; Principal component analysis and factor analysis; Distribution and test related with this analysis.

References:

(1) Anderson, T.W.: Introduction to multivariate analysis, Wiley.

(2) Rao, C.R: Linear statistical inference and its applications, Wiley.

(3) Khirsagar, A. M.: Multivariate analysis, Mareel Inc.

2504 STOCHASTIC PROCESSES

Introduction: Random Walk, Markov Processes, Branching processes - Review. Brownian Motion: Definition and examples, continuity of path, Maximum Variables, Multidimensional Brownian motion. Queuing processes: Single server queuing process, M/M/1 , M/G/1 , G/M/1, G/G/1 queues. Stationary processes: Covariance function, Mean square distance, Stationary processes - Time and frequency domain, prediction, filtering and regulation problems. Point Processes: The renewal process, stationary point processes, real valued processes with point processes. Gaussian processes: Definition and example, Stationary, Gaussian and Markovian processes.

References:

1. Karlin, S.: A first course in stochastic processes and Taylor, H.M.

2. Cox and miller; Theory of stochastic processes, Chapman and Hall Ltd.

3. Feller, W.; An introduction to probability theory and it's applications; Wiley 1971.

4. Fisz, M.; Probability theory and Math. Statistics.

5. Doob, J.L.; Stochastic processes; J. Wiley, 1953.

2600* Bio-Statistics

*Part I: Six ideas of sampling methods, sampling distributions of means, t , χ^2 , F and their large sample approximations . Decision theory approach to one sample and two samples inference.

*Part II: Regression analysis and significance test of regression model. Interpretation of coefficient of determination for full and partial model. Test of simple and multiple correlations.

*Part III: Basic principles in experimental designs, single factor ANOVA (CRD) for balanced and unbalanced cases. Multiple comparisons (tests), comparing treatment with control. Two factor ANOVA (RBD) with missing values, LSD with missing values . Introduction to factorial designs (only for two levels).

*Part IV: Test of Attributes: Goodness of fit, Contingency tables , test of Independence. Some non-Parametric tests. Interval estimation for some Order Statistics.

References:

1. Dantel, Wayne.W; Bio-Statistics, A Foundation for Analysis in the health sciences.
2. Fowler, J & Cohen, L: Practical Statistics for Field Biology .
3. Schefler W.C.: Statistics for Biological Sciences.
4- Walpole R.E; Introduction to Statistics.

*** M.Sc. students of Chemical and Biological sciences .**

2601 Experimental Design

Review of symmetric factorial experiments. Algebric representation of main effects and interaction, estimation and analysis of some factorial experiments. Analysis of confounded factorial experiments. Factorial replications. A symmetric factorial experiments. Estimable function and its properties. General linear model of non-full ran . Generalized inverse of matrices. Tests for full and part models. Non-orthogonal designs. Least square estimates and analysis of two-way non-orthogonal designs. General block design. Incomplete block designs. PBIB design. Intra- and block analysis of incomplete block design. Youden square design. Lattice design. Construction of incomplete block design. Multi-way non-orthogonal designs. Residual effects, Weighing designs. Analysis of covariance with two ancillary variates, covariance and analysis of experiments with missing observations. Random and mixed effect model. Variance component analysis. Response surface design. First order and second order models. Methods of steepestascent. Groups of experiments. Ideas of D-optimality, Rotatibility and connectedness.

References:

1. John, P.W.: Statistical design and analysis of expt.; Macmillan.
2. Graybill, F.A.: An introduction to linear statistical models; Mac Graw-Hill.
3. Liner, B.J.: Statistical Principle in expt. design; Mac Graw – Hill.
4. Montgomery, D.C.: Design and analysis of ext.; J. Wiley M.Y.
5. Mayers, R.H.: Response surface Methodology, Allyn and Bacon. Inc. Boston.
6. Raghjararao, D.: Constracution and combinatorial problems in design of expt. ; Wiley.

2602 THEORY OF SAMPLING

Single-stage sampling of unequal clusters: selection of unequal clusters with unequal probability without replacement; Horvitz-Thompson estimator; other methods of estimation; Estimation of standard errors. Sub-sampling: Two-stage and higher-stage sampling with equal clusters; optimum allocation of clusters; sub-sampling with unequal clusters; Multi-stage sampling PSU'S selected with equal and unequal probability with or without replacement; Unbiased and ratio estimates; random group methods, self-weighing estimates; non-linear estimates of standard errors; Stratified multistage sampling. Double Sampling: Use of double sampling for stratification; regression estimators; ratio estimators and PPS estimation; Optimum allocation. Repeated sampling, sampling on two or more occasions. Sources of errors in survey; Non-response and non-sampling error; Interviewer variability; interpenetrating subsamples; error of measurement, Familiarity with large-scale sample survey.

References:

(1) Cochran, W.G.: Sampling techniques; Wiley.

(2) Raj, D.: Sampling theory; MacGraw – Hill.

(3) Kendall and Stuart; Advanced theory of statistics V.3, Charles Griffins.

2603 Theory Decision

General description of decision problems. Utility and loss function, decision rules, expected utility principle. Simple problem with finite decision and parameter spaces. Problems without prior distribution, Risk function, Dominance, admissibility, Completeness, minimax.Baysian decision rules: Baysian approach for more general problems with application to point estimation, discrimination, hypotheses testing. 2-decision problem with linear loss function. Baysian decision prediction.

References:

1. Ferguson, T.S.: Mathematical statistics. A decision theoretical approach, Academic press, 1967.
2. De Groot, M.H.: Optimal statistical Decision. Mc Graw-Hill 1970.
3. Aitchison, J. and Dunsmore, I.R.: Statistical prediction analysis 1975, Cambridge.

Introduction reading:

4. Lindly, D.V.: Making decision; Wiley 1971.
4. Lindgren, B.W.: Elementary Decision theory; Mac Millan, 1971.

2604 Time series analysis

A quick review on concepts of time series. Probability models for time series: stochastic processes, Stationary process. Auto correlation function. Auto-regressive processes: MA, AR, ARMA and ARIMA processes. Estimation of parameters of models: Estimation of auto covariance and auto-correlation functions. Estimation of parameters of different auto-regressive processes. Residual analysis. Stationary Processes: Spectral distribution and density function, Spectral analysis - Fourier analysis. Myquist frequency, Perio dogram analysis. Relationship between priodogram and auto correlation functions. Truncated autocorrelation function. First Fourier transforms. Ideas of bivariate time - series: Cross - covariance and cross - correlation functions. Cross spectrum - linear system.

References:

(1) Chatfield, C.: The analysis of time series, An introduction; Chapman& Hall.

(2) Box and Jankins: Time series analysis, Forecasting and control; Holden Day.

(3) Kendal, M.G. and Stuart: Advanced Theory of Statistics V.3, Charele's Griffin.

(4) Andrson, T.W.: Analysis of time series, Wiley and Sons.

2605 Econometrics

Theory Part: A short review of general linear model where assumptions break down. General linear model with stochastic regression. General linear model with lagged variables: Lagged explanatory variables, lagged dependent variable, Estimation of parameters. Simultaneous Equation Methods: (a) Identification: Simultaneous Equation system, Identification problems. (b) Estimation: Recursive system, Two-stage and three-stage least squares, Limited information (Least variance ratio) Estimators. Applied Part: Income distribution, Demand-supply curves; production and consumption function, Cobb-Web models, Cobb-Douglas production function, CES production function, Input - output analysis.

References:

(1) Johnston, J: Econometric methods, Mc Graw - Hill, N.Y.

(2) Golderger, A.S.: Econometric Theory, John-Wiley and Sons, N.Y.

(3) Leser, C.E.V, Econometric Techniques and problems; Charles Griffin, London.

(4) Klein, L.R.: A text book of Econometrics; Evanston, Row eterson & Co.

(5) Fisher, F.M.: The Identification problem in Econometrics, Mc Graw-Hill, N. Y.

2606 Probability Theory

Elements of measure theory: Topological space, Fields and Fields of subsets, measurable functions. Measure: Definition and properties, Finite and additive measure, Borel sets, Lebesgue measure, Lebesgue integral, Radon-Mikodyn theorem, Riemann-Stieltjes integral. Probability space, independent events, conditional probability and conditional probability space, Baye's rule.

Random variables: Random variable as a measurable function, independence, Distribution of random variable, Distribution and density functions, Parameters of distribution, Distribution of functions of random variable, Joint and marginal densities, Conditional densities, Convolutions, probability generating function, Characteristic functions. Sequences of random variables: Concepts of convergence, Weak and strong law for independent and identically distributed random variables, Laws of large numbers, Central limit theorem and some of it's extensions, Infinitely divisible and stable distributions.

References

(1) Feller, W.: An introduction to probability theory and it's applications, Vol. II, Wiley.

(2) Cramer, H.: Random variables and probability Distributions, UMIVER. Press Cambridge

(3) Renyi, A.: Probability theory, Morth Holland Pub. Company, Amsterdam.

(4) Fisz; M.: Probability theory and Math. Statistics, Wiley.

(5) Chung, K.L.: A course in Probability theory, Academic press.

(6) Papoulis, A.: probability, Random variables and Stochastic processes; Mc Graw – Hill.

(7) Burril, C.W.: Measures Integration and probability, Mc Graw – Hill.

(8) Parzen, E.: Modern Probability theory and it's applications, J. Wiley.

(9) Aram J. Thomsian : The structure of probability and stochastic processes , Mc Graw- Hill .

2607 Operations Research

Constrained Optimization: The general mathematical programming problem; Linear programming as a special case, Mathematical formulation of some practical problems as linear programming pros, Graphical solution methods, Canonical and standard of L.P.P.; the simplex method; fundamental properties of solutions, corroboration of extreme points, Simplex algorithm. Duality theory-Writing dual of a L.P.P. and duality relations. The Transportation problem - Description, the transportation table, methods of finding initial basic feasible solutions, the transportation algorithm, degeneracy in T.P., unbalanced T.P. The assignment problem: Nature of the problem, it's mathematical formulation as a linear program, the assignment algorithm, the unbalanced A.P. Advanced topics in programming: Linear factorial programming, Factorial algorithm, Stochastic programming and chance constrained programming, concepts of quadratic, dynamic discrete programming.

References:

(1) Taha,H.A. - Operation research - An introduction , Mac Millan .

(2) Vojda, S. - Mathematical programming, Addison – Wesley.

(3) Kantiswarup -Linear Fractional programming Operations Research, V.13 (1965) PP 1029 –1036.

(4) Garvin W.W - Introduction to linear Programming, Mc Graw – Hill.

(5) Sasiemi,M; Yaspan, A. and Friednien, L.Operational Research (Methods and Problems) J.Wiley.

(6) Gottfried, B.S. and Weisman, J. - Introduction to Optimization theory; Prentic-Hill.

2608 POPULATION ANALYSIS

Collection of Census and vital statistics; Errors in census and vital statistics; Fertility and reproduction; Mortality projections and theories; Family formation, Composition and dissolution; Nuptiality; Distribution of population; Growth of population; Population estimates and projection; Health statistics; Morbidity analysis; Epidemeology; Survival analysis.

References:

(1) Demography - P.R. Cox.

(2) Principles of Demography - D.J. Bogne.

(3) Introduction to Demography - Spiegelman.

(4) The study of population - Houser and Duncan.

(5) Health and vital statistics - Bernard Benjamin.

2609 PREDICTION, FORECASTING AND CONTROL

Linear least squares prediction problem; Wiener and Kolmogrov methods; applications in standard stationary time series models; extension to filtering theory: recursive relations for predictors; standard forecasting techniques (IWMA, Brown, Holt); control of linear stochastic systems loss functions; Principle of certainty equivalence; Box-Jenkins feedback controllers; optimal regulation; estimation of parameters in linear system; estimation of transfer functions in open and closed loop system.

References:

(1) ASTROM, K.J. : Introduction to Stochastic Control Theory, (Academic Press 1971).

(2) BOX, G.: Time Series Analysis, Forecasting and Control, JENkINS, G.M. (Holden-Day, 1970).

(3) WHITTLE, P.: Prediction and Regulation by least-squares methods (English Universities press, 1963).

2610 MEDICAL STATISTICS

(1) Methodology and Model Building: Problem solving in human activity system-specifically in health and health care; the role of statistics in evaluating models; types of model; criteria for appropriateness of models. Discussion of journal articles with a health context.

(2) Linear programming: The linear model; primal and dual problems; shadow prices; reduced costs; sensitivity analysis; optimality in medical context. Discussion on the DHSS "Balance of Care" model.

(3) Simulation: Deterministic and probabilistic simulation models. Advantages and disadvantages in their use. Description of model for population cancer screening; it's validity and use in policy formulation; Gaming simulation; Monte-Carlo models; their use in resource allocation in hospital. Discussion of paper concerned with dialysis/renal transplantation.

(4) Drug Evaluation: Phases of investigation, randomized controlled trials, numbers of patients required, treatment allocation and stratification,

placebo effects, within-patient comparisons. Statistics in the pharmaceutical industry.

(5) Distribution-Free Methods: Clinical measurement and ordinal scales, distribution free nature of ranks, one-sample and two-sample tests based on ranks, methods using empirical distribution function, comparison with parametric techniques, choice of test for a medical data set.

(6) Utility in Medicine: Utility functions; the fractile technique; utility axioms; application to the measurement of illness; individual utilities with respect to treatment options (e.g. 5 year survival lung cancer); community utilities providing an objective function for health services; benefit and cost assessment of health policy options. Discussion of journal articles.

(7) Analysis of Survival Data: Patient survival studies and " censored " observations; survivorship function and hazard functions; product-Limit estimate of survival curve; clinical life tables; estimation and inference in the exponential distribution; other distributions of survival time; use of concomitant information and regression models.

References:

(1) GROSS, A.J. and CLARK, V.A.: Survival Distribution: Reliability Applications in the Biomedical Sciences (Wiley 1975).

(2) PETO, R., PIKE, M.C. *et. al*.: Design and analysis of randomized clinical trials requiring prolonged observation of each patient. I.introduction and design. Br.J. cancer (1976) 34, 585.

(3) De NEUFVILLE, R. and STAFFORD, J.H.: System analysis for engineers and managers (McGraw-Hill 1971).

قائمة بأعضاء هيئة التدريس الذين يقومون بتدريس
الدراسات العليا بقسم الإحصاء

م	الاسم	الجنسية	الدرجة العلمية	التخصص
1	د. محمد مسعود ميكائيل	ليبي	أستاذ مشارك	سلاسل زمنية
2	د. جبريل محمد شامية	ليبي	أستاذ مشارك	إحصاء البيئي
3	د. ياسمينة بوزيد الفقي	ليبية	أستاذ مشارك	تحليل انحداري
4	د. احمد محمد مامي	ليبي	أستاذ مساعد	الانحدار الغير خطي
5	د. يوسف محمد القماطي	ليبي	أستاذ مساعد	التنقيب البياني
6	د. سالم محمد القزيري	ليبي	أستاذ مساعد	تحليل ضو
7	أ. سالم احمد بن عمران	ليبي	أستاذ مساعد	تحليل انحداري