UNIVERSITY OF SARGODHA
OFFICE OF THE REGISTRAR
(ACAD BRANCH)

NOTIFICATION

On the recommendations of Academic Council made in its 24th (1/2025) meeting held on 26.08.2025, the Syndicate in its 72nd (4/2025) meeting held on 12.09.2025 has approved the revised curricula of following programs for implementation w.e.f. **Fall 2025.**

I.	Associate Degree in Statistics	(Annex-'A')
II.	BS in Statistics	(Annex-'B')
III.	BS in Statistics (5th Semester Intake)	(Annex-'C')
IV.	M.Phil Statistics	(Annex-'D')
V.	Ph.D in Statistics	(Annex-'E')

(WAQAR AHMAD)
Additional Registrar (General)

No. SU/Acad/25/ 1200 Dated: 06.11.2025

Distribution:

- Chairman, Department of Statistics
- Controller of Examinations
- Director Academics

C.C:

- Dean Faculty of Sciences
- Director, QEC
- Additional Registrar (A & R) *{With the request to forward the notification alongwith curriculum to all Principals of affiliated colleges concerned}*
- Secretary to the Vice-Chancellor
- PA to Registrar
- Notification File

SCHEME OF STUDY

AND

COURSE OUTLINE

FOR

PHD PROGRAM IN STATISTICS

Session Spring 2025 Onward

DEPARTMENT OF STATISTICS

Introduction

Statistical designs and analysis are the key factors for policy and decision making in every sphere of life. Statistics is the need and inevitability of time and for society and industry. PhD Statistics program will pave the way for scholars to innovate, produce new horizons of subject matter and productive work for society .The program is designed to train the scholars to produce high quality innovation and research to meet the need of society and industry.

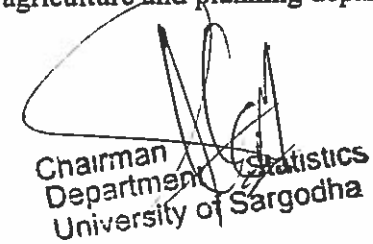
Objectives

Objectives of the PhD Statistics program are listed as:

- To impart the scholars in-depth and a great deal of knowledge about the advancements and developments in the subject
- To train and prepare the scholars to design and conduct high quality original, creative and innovative research in the area of their interest
- To produce specialized scholars to meet the need of society and industry
- To prepare the scholars to disseminate the research output
- To develop dynamic, analytical and scholarly thinking for policy analysis and decision making

Scope

Statistical analysis is the key factor for policy and decision making in every sphere of life. Only the subject Statistics own statistics division in federal government. The career opportunities for graduates of Statistics are available locally and globally. The employability of Statistics is not limited to academia only but it has placement in industry, banks, research organizations, medical, agriculture and planning departments.



Program Structure

Duration of the program	The duration of the PhD Statistics program will be minimum 06 semester (three years) and maximum 16 semester (eight years).
Entry Requirements:	• The candidates must have passed MS/M.Phil. Degree in Statistics, Data Analytics, Data Science, Econometrics & Business Analytics from HEC recognized institutions with at least 1st division or CGPA 3.00 out of 4.00. • The candidates will have to qualify UOS entry test equivalent to HEC- HAT general test having 60% marks and interview conducted by the department. OR HEC HAT general test with at least 60% marks. • HEC/University guidelines issued from time to time regarding Ph.D. shall be applicable • In case of intra-disciplinary terminal degrees, the candidate will have to pass deficiency courses of level 7 and have to pass a separate GRE-Subject/equivalent test (at least 50% marks) in addition to GRE/HAT general test. • Statement of Purpose
Intra-disciplinary fields allowed for admission	MS Data Science MS Econometrics MS Business Analytics
Degree Completion Requirements	The PhD in Statistics program will contain a total of 20 Credit Hours and conduct of research work (thesis).
Program Mode (select one)	Thesis Track
Specialization (if any)	Nil

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Scheme of Studies

Doctor of Philosophy in Statistics

Semester-I

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
Deficiency-1*	STAT-7101	Linear Models	3(3-0)	Nil
Elective-1	STAT-81XX	Course will be decided from list of Elective courses	3(3-0)	Nil
Elective-2	STAT-81XX	Course will be decided from list of Elective courses	3(3-0)	Nil
Elective-3	STAT-81XX	Course will be decided from list of Elective courses	3(3-0)	Nil

*** For Intra-disciplinary admitted candidates only**

Semester-II

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
Deficiency-2*	STAT-7102	Advanced Statistical Inference	3(3-0)	Nil
Elective -4	STAT-81XX	Course will be decided from list of Elective courses	3(3-0)	Nil
Elective -5	STAT-81XX	Course will be decided from list of Elective courses	3(3-0)	Nil
Elective -6	STAT-81XX	Course will be decided from list of Elective courses	3(3-0)	Nil

*** For Intra-disciplinary admitted candidates only**

Semester-III and onwards

Category	Course Code	Course Title	Credit Hours	Pre-Requisite
Deficiency-3*	STAT-7103	Survey Sampling	3(3-0)	Nil
General Edu.	URCG-5129	Understanding of Holy Quran – I	1 (0-1)	Nil
General Edu.	URCG-5130	Understanding of Holy Quran – II	1 (0-1)	Nil
General Edu.	URCG-5131	Ethics – I (for non-Muslims)	1 (0-1)	Nil
General Edu.	URCG-5132	Ethics – II (for non-Muslims)	1 (0-1)	Nil
Research		Thesis	06	Course Work and Comprehensive Exam.

*** For Intra-disciplinary admitted candidates only**

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List of Deficiency Courses of Level-7:*(for intra-disciplinary admissions only)*

Sr. No.	Course Code	Course Title	Credit Hours	Prerequisite
1.	STAT-7101	Linear Models	3(3-0)	Nil
2.	STAT-7102	Advanced Statistical Inference	3(3-0)	Nil
3.	STAT-7103	Survey Sampling	3(3-0)	Nil

The list of courses PhD Statistics is as follows:

1.	STAT-8101	Recent Developments in Statistical Process Control	3(3-0)
2.	STAT-8102	Advanced Survey Sampling	3(3-0)
3.	STAT-8103	Advanced Topics in Design of Experiments	3(3-0)
4.	STAT-8104	Advanced Bio-Statistics	3(3-0)
5.	STAT-8105	Advanced Theory of Statistics	3(3-0)
6.	STAT-8106	Advanced Linear Models and Diagnostic Methods	3(3-0)
7.	STAT-8107	Advanced Non-Parametric and Robust Methods	3(3-0)
8.	STAT-8108	Advanced Demographic Techniques	3(3-0)
9.	STAT-8109	Randomized Response Techniques	3(3-0)
10.	STAT-8110	Geo-Statistics	3(3-0)
11.	STAT-8111	Financial Econometrics	3(3-0)
12.	STAT-8112	Advanced Response Surface Methodology	3(3-0)
13.	STAT-8113	Spatio-Temporal Analysis	3(3-0)
14.	STAT-8114	Advanced Bayesian Statistics: Techniques and Models	3(3-0)
15.	STAT-8115	Advanced Time Series Analysis	3(3-0)
16.	STAT-8116	Recent Developments in Generalized Linear Models	3(3-0)
17.	STAT-8117	Handling Missing Data	3(3-0)
18.	STAT-8118	Advanced Topics in Machine Learning	3(3-0)
19.	STAT-8119	Advanced Topics in Deep Learning	3(3-0)

The courses can be offered depending upon the availability of faculty.

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Comprehensive Examination Policy

As per HEC/University guidelines, after the completion of coursework (two semesters 18 credit hours), every PhD scholar shall be required to pass a comprehensive examination in order to be granted candidacy as a PhD researcher. Furthermore, the comprehensive examination will be conducted as per university rules.

Thesis Evaluation Policy

As per HEC/University guidelines, the PhD dissertation must be evaluated by foreigner experts from academically advanced countries and local experts for award of Ph.D. in Statistics.

Plagiarism Policy

Before sending the PhD thesis for evaluation to foreigner and local experts as per HEC/University Guidelines, complete thesis should have less than 19% plagiarism with a single source of less than 5% for award of PhD in Statistics.

Research Publications Policy

For award of PhD degree, a PhD researcher shall be required to publish research article at least:

i. One research article in W category journal

OR

ii. Two research articles in X category journals.

Policy notified by HEC/University will be followed over time.

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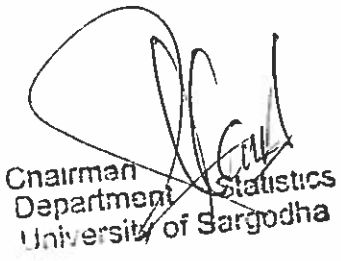
STAT-8101 Recent Developments in Statistical Process Control 3(3-0)

Dimensions of quality control, total quality managements, statistical process control and its tools, Memoryless and Memory type control charts in univariate and multivariate set up. Control charts with different samplings schemes: simple random sampling, successive sampling and its variations, two phase sampling, ranked set sampling and its variations. Effects of different sampling schemes on the performance of control charts. Mixed control charts. Combined control charts. Non-parametric and robust control charts. Enhanced control charts with auxiliary information and using different run rules schemes. Process capability analysis, Acceptance sampling plans. Bayesian methodology for construction of charts. Role of Monte Carlo Simulation in control charts.

Books Recommended

1. Montgomery, D.C. (2013). *Introduction to Statistical Quality Control*. 8th edn. John Wiley & Sons.
2. Oakland, J.S. (2007). *Statistical Process Control*. 6th edn. Butterworth-Heinemann, Elsevier Science Publisher.
3. Alwan, L.C. (2000). *Statistical Process Analysis*. McGraw-Hill.
4. Farnum N.R. (1994). *Statistical Quality Control and Improvement*. Duxbury.
5. Quesenberry, C.P. (1997). *SPC Methods for Quality Improvement*. John Wiley and Sons.
6. Wheeler, D.J. (1995). *Advance Topics in Statistical Process Control- the Power of Shewhart's Charts*. SPC Press, Knoxville.
7. Ryan, T.P. (1989). *Statistically Methods for Quality Improvement*. John Wiley and Sons.



STAT-8102 **Advanced Survey Sampling** **3(3-0)**

Modern techniques of survey sampling. Estimation of population parameters: Ratio, Product, Regression and difference estimators, for population mean, population total. Variance estimators, Complex estimators, Estimators in rank set sampling (RSS), Median RSS, Extreme RSS, Double RSS, Fractional RSS. Sampling with Probability proportional to size with replacement. Hansen–Hurwitz estimator, Lahiri selection procedure. Sampling with Probability proportional to size without replacement. Horvitz and Thompson estimator, Sen-Yates-Grundy variance estimator. Selection procedures: Yates and Grundy Procedure, Brewer's Draw by Draw Procedure. Calibration Methods, Double sampling, Two occasion and more than two occasion sampling, Prediction approach, Poisson sampling, Cosmetic calibration , Dual frame sampling, Successive sampling, Adaptive methods in sampling. Robust Sampling methods. Imputation techniques. Non-response: Types of non-response, Response rates, Reasons for non-response, Prevention of non-response. Weighting for unequal selection probabilities, Sample-based weighting, Population-based weighting, Calibration weighting methods, Bias and variance properties of weighting methods, Sub-sampling technique, Non-respondent sub-sampling and substitution, Approaches to item non-response, Model approaches to missing data. Estimators of population parameters using sub-sampling technique with one, two and multi auxiliary variables in the presence of non-response.

Books Recommended

1. Bethlehem J, Cobben F., and Schouten B, (2011). *Handbook of Nonresponse in Household Surveys.* Hoboken: Wiley
2. Singh, S. (2003). *Advanced Sampling Theory with Applications-How Michael selected Amy*. Kluwar Academic Publishers.
3. Cingi, H and Kadilar, C., (2009). *Advances in Sampling Theory-ratio method of estimation*. Bentham Science Publishers.
4. Brewer, K.R.W. and Hanif, M., (1983). *Sampling with Unequal Probabilities*. Springer-Verlag New York Inc.
5. Zakula, G., (1999). *Elements of Sampling Theory and Methods*. Prentice Hall.
6. Cochran, W.G., (1977). *Sampling Techniques*, Jhon Wiley & Sons.
7. Sukhatme, P.V., Sukhatme, B.., Sukhatme, S. and Asok, C., (1984). *Sampling Theory of Surveys with Application*. Iowa State Uni. Press.
8. Sarndal, C. E, Swensson, B. and Wretman, J., (1992). *Model Assisted Survey Sampling*. Springer-Verlag.
9. Groves, R, Dillman D.A., Eltinge J.L. and Little R.J.A., (2002). *Survey Non-Response*. New York: Wiley.

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STAT-8103 **Advanced Topics in Design of Experiments** **3(3-0)**

Incomplete block design: Balanced and partially balanced incomplete block designs: construction, analysis, classification and existence. Competition designs and their analysis. Recent topics in the design of experiments. Designs with random factors, Advanced nested design, Cross over design, structure of cross over design, classification and analysis, Analysis of covariance, unbalanced data and their handling methods, Repeated measures, Trend analysis, multi-factor experiments in repeated measures.

Books Recommended

1. Montgomery D. C., (2001). *Design and Analysis of Experiments*. John Wiley, New York.
2. Cox, D. R, Reid, N., Jt. Auth. (2000). *The Theory of the Design of Experiments*. Chapman and Hall/CRC, Raton.
3. Weber, Donald C., (2000). *A First Course in the Design of Experiments; A linear Model Approach.* CRC Press, Boca Raton.
4. Boniface, D. R., (1995). *Experiment Design and Statistical Methods*. Chapman and Hall.
5. Harold, R. L., (1992). *Analysis of Variance in Experimental Design*. Springer Verlag.
6. Maxwell, S. E. and Delancey, H. D., (1990). *Designing Experiments and Analysis of Data, A Model Comparison Perspective*. Belmant and Wadeson.
7. Mead, R. (1988). *The Design of Experiments–Statistics Principles for Practical Applications*. Cambridge University Press.

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STAT-8104 **Advanced Bio-Statistics** **3(3-0)**

Analysis of the paired data; Paired, repeated and matched variables, Normality, Paired t-test. Analysis of variance (ANOVA); The F-criterion and comparison of variances, Multi way ANOVA, Generalizations of ANOVA. Randomization and randomization-based analysis; Randomized experiment, Survey sampling and resampling. Survival Analysis; Common terms, Cox regression analysis, Tree-structure models. Bayesian statistics; Bayesian probability, Likelihood, Prior and posterior, Empirical Bayes models, Bayesian information criterion, Maximum a posteriori estimation. Dichotomous variables, Binomial test and sign test, Circular data, Von-Mises distribution and its application to circular data, Angular mean, Angular dispersion and interpretation, Circular hypothesis testing. Principal Component Analysis and Cluster Analysis.

Books Recommended

1. Westfall, P., & Henning, K. S. (2013). *Understanding advanced statistical methods*. CRC Press.
2. Triola, M. M., & Triola, M. F. (2006). *Biostatistics for the biological and health sciences* (pp. 47-48). Boston: Pearson Addison-Wesley.
3. Whitlock, M. C., & Schluter, D. (2009). *The analysis of biological data* (p.700). Greenwood Village, CO: Roberts and Company Publishers.

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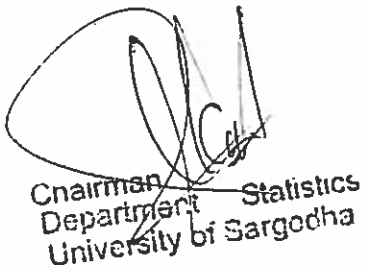
STAT-8105 **Advanced Theory of Statistics** **3(3-0)**

Probability measures, expectations, conditioning, convergence of random sequences, law of large numbers, central limit theory, characteristic functions, discrete distributions, continuous distributions, Pearson systems of distributions, Chebyshev-Hermite polynomials, Gram-Charlier Series (Type-A), polynomial transformation to normality. Order statistics and their sampling. Bootstrapping techniques, Monte Carlo simulation, Makov chain methods, Integral equation methods, optimization techniques, Bayesian Decision and Bayesian inference. Methods of elicitations. Gibbs sampling. Probability weighted measures: Downton's estimator, Gini mean difference, Properties of robust estimation: Influence function, breakdown point, gross over sensitivity.

Books Recommended

1. Billingsely, P. (1986). *Probability and Measure.* 2nd ed. John Wiley and Sons.
2. Johnson, N.L. and Kotz, S. (1987). *Continuous Univariate Distribution.* Vol-1 & 2, John Wiley and Sons.
3. Stuart, A. and Ord, J.K. (1987). *Kendall's Advanced Theory of Statistics.* Vol-1, 5th ed. Chales Griffin and Co. Ltd.

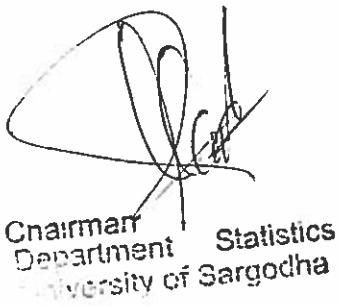


STAT-8106 Advanced Linear Models and Diagnostic Methods 3(3-0)

Overview of Sttistical Models; Types of Statistical Models; Linear Models, Generalized Linear Models, Non-linear Models. Estimtion Methods:least square, mximum, likelihood and iterative reweighted algorithms. Recent developments in linear model residuals and dignostics analysis. Recent developments in non-linear models and mixed model estimation with diagnostics. Linear and Non-linear models outlier and influence dinostic methods with error in vriables. Linear and Non-linear models outlier and influence dinostic methods with correlated regressors.

Recommended Books

1. Belsley, D.A., Kuh, E. and Welsch, R. (1980). *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*. New York: Wiley.
2. Draper, N.R. & Smith, H. (2004). *Applied regression analysis*. New York: John Wiley & Sons.
3. Kutner, M.H., Nachtsheim, C.J., Neter, J., and Li, W. (2005). *Applied Linear Statistical Models*, 5th Edition. McGraw Hill, New York.
4. Agresti, A. (2015). *Foundations of linear and generalized linear models*. New York: John Wiley & Sons.
5. Myers, R. H., Montgomery, D. C., Vining, G.G. & Robinson, T. J. (2010). *Generalized linear models with applications in engineering and the sciences,* (2nd ed.). New York: John Wiley & Sons.

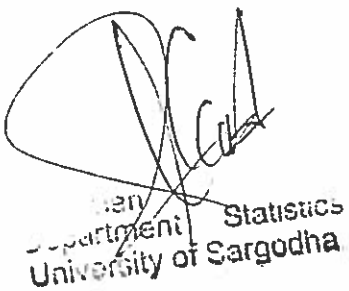


STAT-8107 **Advanced Non-Parametric and Robust Methods** **3(3-0)**

Common non-parametric tests, Non-parametric analysis of variance, Non-parametric regression, Graphical method, Theil method and Sen method, Robust method, walsh average, pair-wise distances, quantiles based measures, robustness, breakdown and the influence cure, estimation using M, L and R Statistics, Contaminated distributions, Contaminated normal, t and mixture distributions, Sampling-resampling Methods: Bootstrap and Jackknife. Confidence Intervals Monte Carlo simulation, Robust inference.

Books Recommended

1. Gibbons, J. D. and Chakrabortic, S., (2021). *Nonparametric Statistical Inference*. Chapman and Hall.
2. Conover, W. J., (1999). *Practical Nonparametric Statistics*. 3rd Ed., John Wiley and Sons. New York.
3. Maritz, J. S., (1995). *Distribution Free Statistical Methods*. Chapman and Hall, London.
4. Conover, W. J., (1999). *Practical Nonparametric Statistics*. 3rd Ed., John Wiley and Sons. New York.
5. Farcomeni, A., and Greco, L. (2015). *Robust Method for Data Reduction*, (1st ed.), Chapman and Hall.
6. Maronna, Ricardo A., et al. (2006). *Robust Statistical Theory and Methods*, (1st ed.), Wiley.
7. Wilcox, R. (2013). *Introduction to Estimation and Hypothesis Testing*, (3rd ed.) Elsevier.
8. Hettmansperger, T. P., and McKean, J. W. (2011). *Robust Nonparametric Statistical Methods*, (2nd ed.), CRC Press.

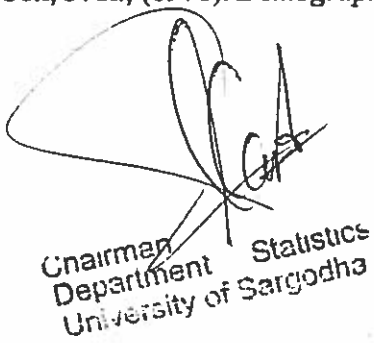


STAT-8108 **Advanced Demographic Techniques** **3(3-0)**

State of Population: Stable and stationary population models, Theories of population growth, Population estimates and projections. Demographic effects of Population Growth. Economic, political and social implication. Consequences of a world population growth. Development of demographic profile in Pakistan. Pakistan's place at global level, Recent demographic parameters, current and future demographic activities in Pakistan. Mathematical and Statistical Demography.

Books Recommended

1. Hind, A., (1998). *Demographic Methods*. Arnold.
2. United Nations. (1998). *Word Population Assessment*, UNFPA; New York.
3. Palmore, J. A. and Gardner, R.W., (1994). *Measuring Mortality Increase*. East West centre, Honolulu.
4. Pollarad, A. H., Yusuf F., Pollard G. N. (1983). *Demographic Technique*. Pergamon Press, Oxford, Eng.
5. Natham K., (1983). *Applied Mathematical Demography*. Springer Verlag, New York.
6. Cox, P. R., (1978). *Demography*. Cambridge Univ. Press.



STAT-8109 **Randomized Response** **3(3-0)**

Introduction to Randomized Response: Warner Model, the unrelated-question model, polychotomous population and multi attribute situations, Techniques for quantitative characteristics, Efficient estimation and protection of privacy, Miscellaneous topics on randomize response techniques: a bayesian approach, lying models, direct response and some allied methods for sensitive characters, Randomized Response in a finite population setting: sampling with unequal probabilities.

Books Recommended

1. Chaudhuri, A. (2011). *Randomized Response and Indirect Questioning Techniques in Surveys*. Chapman & Hall.
2. Chaudhuri, A. and Mukherjee, R. (1987). *Randomized Response: Theory and Techniques*. Marcel Dekker.
3. Fox, J. A. and Tracy, P.E., (1986). *Randomized Response: A Method for Sensitive Surveys*. Sage Publications.
4. Paul, M. (1981). *Randomized Response Technique: getting in touch with touchy questions*. COMAP Publisher.
5. Wayne W. D., (1993). *Collecting Sensitive Data by Randomized Response: an annotated bibliography*. Georgia State University Business Press.

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STAT-8110 **Geo-Statistics** **3(3-0)**

Introduction to geo statistics, spatial statistics and non-spatial statistics, overview of different types of spatial data, Spatial Covariance, Spatial Autocorrelation, Point Pattern Analysis, Semi-variance, variograms and covariance functions, fitting variogram functions, kriging, Spatial regression analysis and smoothing methods. Areal data: neighborhoods, testing for spatial association, Global and local tests of association, CAR and SAR models, inferential statistics, mapping using GIS, types of spatial patterns, CSR and tests. Clustering and Cluster analysis, dendogram, Principal component analysis, Bayesian methods for spatial statistics, Bayesian mapping, Spatio-temporal modeling

Books Recommended

1. Schabenberger O. and Gotway. C. A. (2005). *Statistical Methods for Spatial Data Analysis.* Chapman & Hall.
2. S. Banerjee B. Carlin, and A. Gelfand. (2004). *Bayesian and Hierarchical Modeling of Spatial Data: Hierarchical Modeling and Analysis for Spatial Data.* Chapman and Hall.
3. W. N. Venables and B. D. Ripley. (2002). *Modern Applied Statistics with S.* Fourth Edition, Springer. 2)
4. T. Ormsby, E. Napoleon, R. Burke, C. Groessl, L. Bowden. (2010). *Getting to Know ArcGIS Desktop.* Second Edition, Redlands: ESRI Press.
5. Lance A. Waller and Carol A. Gotway. (2004). *Applied Spatial Statistics for Public Health Data.* John Wiley & Sons.

STAT-8111 **Financial Econometrics** **3(3-0)**

Stochastic Processes and Financial time Series, Shock Persistence and impulse response analysis, Estimating Capital Asset Pricing Models (CAPM), Modeling of equity returns, trading day effects, and volatility estimations. In addition, recent advancements in financial time series including the unit root phenomenon, co-integration, Autoregressive Conditional Heteroscedasticity (ARCH) and Generalized Autoregressive Conditional Heteroscedasticity (GARCH), stochastic volatility modeling, trend break analysis and nonlinearity will be covered Measure of Stock Market Integration.

Books Recommended

1. Chatfield, C. (2004). *The Analysis of Time Series*. (5th Ed.) Chapman and Hall, New York.
2. Mills, T.C. (1993). *The Econometric Modeling of Financial Time Series*. Cambridge University Cambridge.
3. Campbell, J. Y., Lo, A. W. and Mackinlay, A. C. (1997). *The Econometrics of Financial Markets*. Princeton University Press.
4. James D. Hamilton (1994). *Time Series Analysis*. Princeton University Press.

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STAT- 8112 **Advanced Response Surface Methodology** **3(3-0)**

Response surface methodology. First, and second-order RS designs. Fitting of response surface models and estimation of optimum response. Desirable properties of a response surface design; Experimental designs for fitting response surfaces. Central composite designs and their variations, Box-Behnken designs, subset designs, Small response surface designs: small composite designs. Robust response surface designs; Orthogonal designs; Rotatable designs; Orthogonal blocking in response surface designs; Practical design optimality criteria: D-, Ds ,- A-, As-, G, Gs-Optimality. Tradeoff between different optimality criteria; Graphical procedures for evaluating the estimation capability of a response surface design: variance dispersion graphs, fraction of design space plots. Some new response surface designs for the estimation of a second-order multivariate polynomial model; Response optimization through mixture experiments.

Recommended Books

1. Kayaroganam,P. ((2023). *Response Surface Methodology- Research Advances and Applications*. Intechopen.
2. Montgomery, D.C. (2022). *Design and Analysis of Experiments*, 9th Ed. Wiley, New York.
3. Myers, R. H., Montgomery, D. C., & Anderson-Cook, C. M. (2016). *Response surface methodology: process and product optimization using designed experiments*. John Wiley & Sons.
4. Oehlert, G. W. (2010). *A First Course in Design and Analysis of Experiments*, University of Minnesota.
5. Atkinson, A. C., Donev, A. N. and Tobias, R. D. (2007). *Optimum Experimental Designs with SAS*, Oxford University Press.
6. Box, G.E.P. and Draper, N.R. (2007). *Response Surfaces, Mixtures and Ridge Analyses*. (2nd ed.), Wiley Series in Probability and Statistics.
7. Khuri, A. I. (2006). *Response surface methodology and related topics*. World scientific.
8. Berger, M.P.F. and Wong, W.K. (2005). *Applied Optimal Designs*, Wiley, New York. Khuri,
9. A.I. (2005). *Response Surface Methodology and Related Topics*, Washington, DC: World Sciences.
10. Wu, H. and Wu, C.F.J. (2002). *Experiments: Planning, Analysis, and Parameter Design Optimization*, Wiley, New York.

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STAT-8113 **Applied Spatio-Temporal Analysis** **3(3-0)**

Geo-statistics and spatio-temporal random functions: theoretical framework on spatio-temporal random functions; properties of the spatio-temporal covariance function and semi-variogram, Geo-statistics and spatio-temporal random functions: an overview on some theoretical space-time covariances models, Introduction to different formats of spatial and spatio-temporal in R: spatio-temporal full data frame; spatio- temporal sparse data frame; spatio-temporal irregular data frame, Reading and writing spatial and spatio-temporal data. Subset a spatio-temporal object. Graphical representation of spatio-temporal data, Spatio-temporal structural analysis: semi-variogram and covariogram estimation and model fitting, Semi-variogram estimation. Fitting a spatio-temporal variogram model in R, Spatio-temporal structural analysis: validation and comparison of spatio-temporal semivariogram and covariogram models; some statistical tests on semi-variogram and covariogram characteristics, Spatio-temporal prediction: spatio-temporal kriging; spatio-temporal kriging equations, Scripts in R to test some features of spatio-temporal covariance functions, Spatio-temporal interpolation in R, Case studies by using spatio-temporal datasets

Recommended Books

1. Hristopulos D. T. (2021). *Random Fields for Spatial Data Modeling. A Primer for Scientists and Engineers,* Springer, 867.
2. Abzalov, M., & Abzalov, M. (2016). *Introduction to Geo-statistics. Applied mining geology*, 233-237.
3. Montero JM, Fernández-Avilés G, Mateu J. (2015). *Spatial and Spatio-Temporal Geostatistical Modeling and Kriging*, John Wiley & Sons
4. Sherman M, (2011). *Spatial Statistics and Spatio-Temporal Data. Covariance Functions and Directional Properties*. Wiley, United Kingdom
5. Burrough P.A. & McDonnel R.A. (2007) *Principles of Geographical Information Systems,* (3 ed.), Oxford University Press, New York.
6. Conover W.J. (2006) *Practical Nonparametric Statistics*, John Wiley & Sons, 584.
7. Chatfield C. (2003) *The Analysis of Time Series: An Introduction,* (6 ed.), Chapman and Hall, London, 333.
8. Anderson D.R., Sweeny D.J and Williams T.A. (2002) *Statistics for Business and Economics,* (8 ed.), Thomson Asia Pte Ltd, Singapore, 885.

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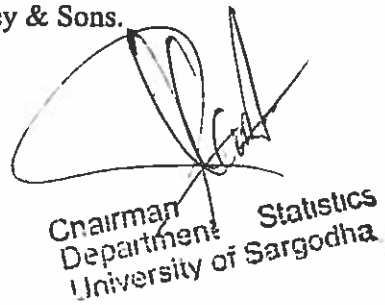
STAT-8114 Advanced Bayesian Statistics: Techniques and Models 3(3-0)

Describe & apply the Bayesian approach to statistics, Bayes rule,Explain the key differences between Bayesian and Frequentist approaches. Prior distribution, Posterior Distribution, Prior selection, Conjugate Priors , Bayesian hypothesis testing, The basic principles behind the algorithm for fitting a mixture model, Expectation and variance of a mixture distribution Computation, Use mixture models to solve classification and clustering problems, and to provide density estimates, Bayesian modeling, Build models that describe temporaldependencies, Analysis and forecasting of times series through Bayesian Statistics, Monte Carlo estimation, Metropolis-Hastings, Gibbs sampling, assessing convergence, Poisson regression, hierarchical modeling,Bayesian Networking , DAG models and algorithms, Implementations Of Bayesian Statistics and modeling in statistical software R

Recommended Books

1. Gelman, A., Carlin, J. B., Stern, H. S., & Rubin, D. B. (1995). *Bayesian data analysis. Chapman and Hall/CRC.*
2. Kruschke, J. (2014). *Doing Bayesian data analysis: A tutorial with R*, JAGS, *and Stan.*
3. McElreath, R. (2018). *Statistical rethinking: A Bayesian course with examples in R and Stan*, Chapman and Hall/CRC.
4. Berger, J. O. (2013). *Statistical decision theory and Bayesian analysis*, Springer Science &
5. Business Media.
6. Bolstad, W. M., & Curran, J. M. (2016). *Introduction to Bayesian statistics*, John Wiley & Sons.



STAT-8115 **Advanced Time Series Analysis** **3(3-0)**

Exploratory techniques for time series,Univariate time series (review and theory): causality and invertibility, linear pro-cesses, why is stationary Gaussian always linear. nonlinear models, characteristics of nonlinear processes, mixing properties, Different models : Random Processes, Random Walk, AR, MA, ARMA, ARIMA, SARMA and SARIMA, exponential smoothing and Forecasting. Multivariate time series models: VAR, Granger causality, cointegration, PCA for vector time series, multivariate volatility models, Diagnostics of time series models, and statespace models (Kalman filter/smoother). Special topics include Bayesian approaches, hidden Markov models, ARCH-GARCH and Forecasting and its turning points. The methodology will be illustrated with the analysis of different data sets in statistical softwares.

Recommended Books

1. Shumway, R. H., Stoffer, D. S., & Stoffer, D. S. (2000). *Time series analysis and its applications* (Vol. 3). New York: springer.
2. Brockwell, P. J., & Davis, R. A. (Eds.). (2002). *Introduction to time series and forecasting*, New York, NY: Springer New York.
3. Box, G.E.P. and Jenkins, G.M. (1970). *Time Series Analysis, Forecasting, and Control*, Holden Day, San Francisco.
4. Cryer, J.D. and Chan, K.-S. (2008). *Time Series Analysis with Applications in R*, Springer, New York

STAT-8116 Recent Developments in Generalized Linear Models 3(3-0)

Introduction to the generalized linear model and applications. Models for continuous response variables: Gaussian, Inverse Gaussian, Exponential, Gamma, Inverse Gaussian, Weibull and Beta models. Models for discrete response variable; logistic regression, Poisson regression, Negative binomial regression, Quasi-Poisson regression, Conway Maxwell Poisson regression models and other newly developed discrete models. Zero- Inflated Models: Zero-Inflated Poisson model, Zero-Inflated Negative model, Zero-Inflated Gamma model and some other newly developed zero-inflated models. Generalized linear model estimation methods: ML estimation, Iterative reweighted procedures and fisher scoring procedures. Explained variation measures for the continuous, discrete and zero-inflated models. Biased Estimation methods for continuous, discrete and zero-inflated models. Robust Estimation methods for continuous, discrete and zero-inflated models. Residual Analysis for continuous, discrete and zero-inflated models. Tests about parameters, the goodness of fit, analysis of deviance and dispersion for continuous, discrete and zero-inflated models. Generalized linear model based process monitoring. Fitting, continuous, discrete and zero-inflated models with different statistical softwares.

Recommended Books

1. Agresti, A. (2015). *Foundations of linear and generalized linear models*. New York: John Wiley & Sons.
2. McCullegh P. & Nelder J.A. (1990). *Generalized linear models*. NEW York: Chapman and Hall.
3. Hardin, J.W. & Hilbe, J.M. (2012). *Generalized linear models and extensions* (3rd ed.). Stata Press Publication.
4. Myers, R. H., Montgomery, D. C., Vining, G.G. & Robinson, T. J. (2010). *Generalized linear models with applications in engineering and the sciences*. (2nd ed.). New York: John Wiley & Sons.
5. Annette, J. D. (2001). *An introduction to generalized linear models*. Text in Statistical Science.
6. Dunn, P.K. and Smyth, G.K. (2018). *Generalized linear models with examples in R*. New York,: Springer.

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STAT-8117 **Handling Missing Data** **3(3-0)**

Introduction to Missing Data: Definition and types of missing data, Mechanisms of missingness (Missing Completely at Random, Missing at Random, Missing Not at Random), Consequences of missing data and its impact on statistical analysis. Imputation Methods: Mean, Median and Mode imputation, Hot deck imputation, Regression imputation, Multiple imputation: principles and implementation. Model-Based Approaches: Maximum Likelihood Estimation (MLE) with missing data, Full Information Maximum Likelihood (FIML), Expectation-Maximization (EM) algorithm, Bayesian approaches to missing data, Sensitivity Analysis: Assessing sensitivity to missing data assumptions, Pattern-mixture models, Selection models, Multiple imputation diagnostics. Modern Techniques: Machine learning approaches for missing data imputation (e.g., k-nearest neighbours, random forests). Deep learning methods for missing data imputation, Advantages and challenges of modern techniques

Recommended Books:

1. Enders, C. K. (2022). *Applied missing data analysis*. Guilford Publications.
2. Allison, P. D. (2009). *Missing data. The SAGE handbook of quantitative methods in psychology*. 72-89.
3. Graham, J. W. (2012*). Missing data: Analysis and design*. Springer Science & Business Media.
4. Little, R. J., & Rubin, D. B. (2019). *Statistical analysis with missing data*. (Vol. 793). John Wiley & Sons.
5. Rubin, D. B. (1987). *Multiple imputation for survey nonresponse.*
6. Schafer, J. L. (1997). *Analysis of incomplete multivariate data*. CRC press.
7. McKnight, P. E., McKnight, K. M., Sidani, S., & Figueredo, A. J. (2007). *Missing data: A gentle introduction*. Guilford Press.

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STAT-8118: Advanced Topics in Machine Learning 3(3-0)

Course Description:
This course covers advanced topics in machine learning, focusing on supervised and unsupervised learning, ensemble methods, model evaluation techniques, and applications to real-world structured datasets. Emphasis is placed on statistical interpretation and understanding model behavior.

Course Learning Outcomes (CLOs):

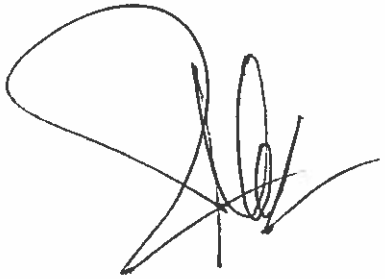
1. Understand and differentiate advanced machine learning algorithms.
2. Apply supervised and unsupervised machine learning models to complex datasets.
3. Analyze model performance using statistical evaluation metrics.
4. Implement ensemble techniques like bagging, boosting, and stacking.
5. Interpret and explain machine learning model results statistically.

Course Contents:

1. Review of Basic Machine Learning Concepts
2. Supervised Learning: Advanced Regression and Classification Methods
3. Unsupervised Learning: Clustering, Dimensionality Reduction
4. Ensemble Learning: Random Forests, AdaBoost, Gradient Boosting Machines (GBM)
5. Model Evaluation: Cross-validation, ROC Curve, AUC
6. Bias-Variance Tradeoff and Regularization Techniques
7. Feature Engineering and Model Selection
8. Applications in Finance, Healthcare, and Environmental Sciences

Recommended Textbooks and References:

1. Géron, A. (2019). *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*. O'Reilly.
2. Murphy, K. P. (2012). *Machine Learning: A Probabilistic Perspective*. MIT Press.
3. Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep Learning*. MIT Press.
4. Research papers and case studies (to be shared during course delivery).



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STAT-8119: Advanced Topics in Deep Learning 3(3-0)

Course Description:
This course explores deep learning architectures and techniques with a focus on statistical applications. Students will learn to design, train, and evaluate deep neural networks, including CNNs, RNNs, and autoencoders, with applications in structured, time-series, and image data.

Course Learning Outcomes (CLOs):

1. Understand deep learning architectures such as CNNs, RNNs, and autoencoders.
2. Train and optimize deep learning models on structured and unstructured datasets.
3. Evaluate model performance with statistical and machine learning metrics.
4. Apply deep learning techniques to time series forecasting, image analysis, and text data.
5. Analyze and interpret deep learning results from a statistical viewpoint.

Course Contents:

1. Introduction to Deep Learning: Overview and Key Concepts
2. Convolutional Neural Networks (CNNs) for Image and Spatial Data
3. Recurrent Neural Networks (RNNs) and LSTM Models for Sequential Data
4. Autoencoders and Representation Learning
5. Optimization Techniques: Adam, RMSProp, Learning Rate Schedules
6. Regularization Methods for Deep Networks (Dropout, Batch Normalization)
7. Evaluation and Validation of Deep Learning Models
8. Applications in Healthcare, Finance, and Environmental Statistics

Recommended Textbooks and References:

1. Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep Learning.* MIT Press.
2. Géron, A. (2019). *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow.* O'Reilly.
3. Chollet, F. (2018). *Deep Learning with Python.* Manning Publications.
4. Research papers and case studies (to be shared during course delivery).

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Model Course Outline
for the Course Understanding of Quran – I

Course Title: Understanding of Quran – I Course Code: URCG-5129
Course Book: Muallim ul Quran (Volume 1, 2 & 3) by Dr Ubaid ur Rahman
Credit Hours: 1 (0-1)
Contact Hours: 3 per week
Weeks: 15-16 (45-48 hours)

Course Learning Outcomes:

By the end of this course, students will be able to:

1. Develop the ability to understand basic words of the Quran, phrases and sentences that do not contain verbs (unit 1 to 5 of Muallim ul Quran Book) and then sentences having present tense (first half of unit 6 of Muallim ul Quran Book).
2. Acquire a strong foundation for understanding long verses of the Quran with clarity.
3. Comprehend Quranic vocabulary, particles (operative & non operative particles) , compounds (Adjective & Possessive compound), pronouns (singular & plural) and types of plural through hundreds of Quranic sentences.
4. Recognize and understand different styles of Quranic sentences, including nominal sentence, emphatic sentence, double emphatic sentence, negative sentence, interrogative sentence, oath –based sentences.
5. Strengthen understanding of fundamental Quranic linguistic styles, expressions and idioms.
6. Understand at least 30 to 40 % of each page of the holy Quran.

Provision of material, content and books:

- **Paper book:** All volumes are available in printed book form.
- **Tutorial videos:** Teaching video of each lesson available on YouTube.
- **Confirmation Videos:** A complete series of confirmation videos of all lessons is available in which the student can confirm his answers.
- **A flipbook:** A flipbook edition is also accessible.
- **Helping material:** Helping material for the teachers like quizzes, question papers and images is available on website.

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Course Outline:

Weeks	Lectures (1.5 hrs)	Units	Lessons	Assignments/Home Task	Linguistic Rules
1.	1.	1	1-6	Writing the meaning of Quranic words Lesson 1-8	Proper Noun Masculine & Feminine
	2.	1	9-14	Writing the meaning of Quranic words 9-14	Two kinds of plural Concept of (و) "And" Common Noun
2.	1.	1	15-17	Writing the meaning of Quranic words, phrases & translation of Sentences 15-17	Demonstrative Noun (This & That for Masculine (هذا- هذه) Demonstrative Noun (This & That for Feminine) (ذلك- تلك)
	2.	1	18-19 & Revision (Unit 1)	Writing the meaning of Quranic words , phrases & translation of Sentences 17-19 Quiz	Laam for emphasis (لام التأكيد) Superlative Degree like أكبر Revision of all Quranic Sentences
3.	1.	Unit 2	1-3	Writing the meaning of Quranic words, phrases & translation of Sentences 1-3	Emphatic Particle إن Preposition "For" (اللام) Preposition (فی)
	2.	2	4-6	Writing the meaning of Quranic words, phrases & translation of Sentences 4-6	Preposition (علی- من- إلی)
4.	1.	2	7- 9	Writing the meaning of Quranic words & translation of Sentences 7-9	Preposition (الباء) Absolute Negation Particle Exceptive Particle (لا النافية للجنس)(ما النافية) (إلا)
	2.	2	10-13 & Revision (Unit 2)	Writing the meaning of Quranic words, phrases & translation of Sentences 10-13 Quiz	Subordinating Conjunction(أن), Was (كان), Vocative Particle(حرف النداء)

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5.	1.	Unit 3	1-2	Writing the meaning of Quranic phrases 1-2	Quranic Adjective Compounds (صفة وموصوف)
	2.	3	3-5	Writing the meaning of Quranic phrases & translation of sentences 3-5	Quranic Possessive Construction (مضاف ومضاف اليه)
6.	1.	3	6 -7	Writing the meaning of Quranic phrase translation of sentences 6-7	Quranic Possessive Construction (مضاف ومضاف اليه)
	2.	3	8-10 & Revision (Unit 3)	Writing the meaning of Quranic phrase & translation of sentences 8-10 Quiz	Active Participle (اسم الفاعل), Passive Participle (اسم المفعول), Dual (مثنى)
7.	1.	Unit 4	1-2	Writing the meaning of Quranic phrase & translation of sentences 1-2	Personal Pronoun He(هو المنفصل) Possessive Pronoun His ـه المتصل)
	2.	4	3-4	Writing the meaning of Quranic phrase & translation of sentences 3 -4	Possessive Pronoun with prepositions like في بيته Pronoun "His" with prepositions like له، منه، فيه
8.	1.	4	5-8	Writing the meaning of Quranic sentences 5-8	Personal Pronoun You(انت المنفصل) Possessive Pronoun Your ك المتصل) Possessive Pronoun with prepositions like في بيتك Pronoun "your" with prepositions like لك، منك، فيك
	2.	Mid Term			

9.	1.	4	9-12	Writing the meaning of Quranic phrases & sentences 9-12	Personal Pronoun She(هي المنفصل) Possessive Pronoun Her ها المتصل) Possessive Pronoun with prepositions like في بيتها Pronoun "Her" with prepositions like لها
	2.	4	13-16	Writing the meaning of Quranic phrases & sentences 13-16	Personal Pronoun I (انا المنفصل) Possessive Pronoun Her ي المتصل) Possessive Pronoun with prepositions like في بيتيPronoun "My" with prepositions like لي
10.	1	4	17 & Revision Unit 4	Revision of all Quranic sentences of Unit 4 Quiz	Adverb (حال)
	2.	Unit 5	1-2	Writing the meaning of Quranic phrases & sentences 1-2	Masculine Plural جمع المذكر السالم و جمع المذكر السالم المسبوق بحرف الجر
11.	1.	5	3-4	Writing the meaning of Quranic phrases & sentences 3-4	Possessive Construction with Plurals جمع المذكر السالم المسبوق بالإضافة
	2.	5	5-6	Writing the meaning of Quranic phrases, sentences & verses 5-6	Personal Pronoun They (هم المنفصل) Possessive Pronoun Their هم المتصل)
12.	1.	5	7-8	Writing the meaning of Quranic phrases, sentences & verses 7-8	Possessive Pronoun with prepositions like في بيتهمPronoun "Their" with prepositions like لهم
	2.	5	9-11	Writing the meaning of Quranic phrases, sentences & verses 9-11	Personal Pronoun You (أنتم المنفصل) Possessive Pronoun Your كم المتصل) Possessive Pronoun with prepositions

					like في بيتكم
13.	1.	5	12-14	Writing the meaning of Quranic phrases & sentences & verses 12-14	Pronoun "Your" with prepositions like لكم Personal Pronoun We (نحن المنفصل) Possessive Pronoun Our نا المتصل)
	2.	5	15-16	Writing the meaning of Quranic sentences & verses 15-16	Possessive Pronoun with prepositions like في بيتنا Pronoun "Our" with prepositions like لنا
14.	1.	5	17-18	Writing the meaning of Quranic sentences & Verses 17-18	Demonstrative Pronoun These, Those (هولاء- اولئك)
	2.	5	19-23	Writing the meaning of Quranic sentences & Verses 19-23	ما / الا، ان / الا، انما، ليس، ما ،) (أ/أم، أن، بل، كأن (ألا، أليس، اليوم، يومئذ، سبحان، مابينهما، قل، اذن، بئس، نعم، كلا، ما أدراك، حسب، أعلم ب، مصير، مرجع، دينا(تمييز)
15.	1.	5	Revision Unit 5	Quiz	
	2.	5	1-3 (till Page 16)	Writing the meaning of Quranic Verbs &Translation of Quranic Sentences & Verses (1-3)	Introduction of Present Tense(فعل مضارع) & Verbal Sentence (جملة فعلية) Present Tense الفعل المضارع صيغة المفرد يعلم
16.	1.	6	3 (From Page 17) & 4 -5	Translation of Quranic Sentences & Verses 3-5	Present Tense الفعل المضارع صيغة المفرد يعلم
	2.	6	6	Translation of Quranic Sentences & Verses	Present Tense الفعل المضارع صيغة الجمع يعلمون

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Model Course Outline
for the Course Understanding of Quran – II

Course Title: Understanding of Quran – II **Course Code:** URCG-5130
Course Book: Muallim ul Quran (Volume 3, 4 & 5) by Dr Ubaid ur Rahman
Credit Hours: 1 (0-1)
Contact Hours: 3 per week
Weeks: 15-16 (45-48 hours)

Course Learning Outcomes:

By the end of this course, students will be able to:

1. Directly comprehend hundreds of Quranic sentences & verses.
2. Understand at least 80 to 85 % of each page of the holy Quran.
3. Understand common verses across different Quranic topics.
4. Achieve proficiency in the basic and advance linguistic aspects of the Arabic language.
5. Understand the difference between Quranic verbs in various forms, such as present, past and imperative.
6. Develop the ability to understand long verses of the holy Quran independently and then comprehend their interpretation.

Provision of material, content and books:

- **Paper book:** All volumes are available in printed book form.
- **Tutorial videos:** Teaching video of each lesson available on YouTube.
- **Confirmation Videos:** A complete series of confirmation videos of all lessons is available in which the student can confirm his answers.
- **A flipbook:** A flipbook edition is also accessible.
- **Helping material:** Helping material for the teachers like quizzes, question papers and images is available on website.

Course Outline:

Weeks	Lectures	Units	Lessons	Assignments/Home Task	
1.	1.	6	6	Understanding & Translation of Verses	Present Tense صیغۃ جمع مذکر غائب مثل یعبدون
	2.	6	7-8	Understanding & Translation of Verses	Present Tense صیغۃ جمع مذکر غائب مثل یعبدون
2.	1.	6	9-10	Understanding & Translation of Verses	Present Tense صیغۃ مفرد مذکر مخاطب (تعبد) وجمع مذکر مخاطب (تعبدون)
	2.	6	11-12	Understanding & Translation of Verses	Present Tense صیغۃ جمع مذکر مخاطب (تعبدون)

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					صيغة المتكلم (أعبد)
3.	1.	6	13	Understanding & Translation of Verses	Present Tense صيغة جمع المتكلم (نعبد)
	2.	6	14-15	Understanding & Translation of Verses	Negative Imperative صيغة المفرد وصيغة الجمع , لا تعبد، لا تعبدوا
4.	1.	6	16-17	Understanding & Translation of Verses	Conditional Sentences & masdar moawal (مصدر موزل)
	2.	6	18-19	Understanding & Translation of Verses	Laam uttaleel (لام التعليل) & Laam ul jhood(لام الجحود)
5.	1.	6	20-21	Understanding & Translation of Verses	Present with object pronouns & Passive Voice
	2.	6	Revision (Unit 6)	Quiz	
6.	1.	Unit 7	1 (sec 1-3)	Understanding & Translation of Verses	Past Tense صيغة المفرد الغائب
	2.	6	1 (Sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة المفرد للغائب
7.	1.	6	1 (Sec 5-6)	Understanding & Translation of Verses	Past Tense صيغة المفرد للغائب
	2.	6	1 (Sec 7-9)	Understanding & Translation of Verses	Past Tense صيغة المفرد للغائب
8.	1.	7	Revision	Understanding & Translation of Verses QUIZ	Past Tense صيغة المفرد للغائب
	2.	MID TERM			
9.	1.	7	2 (sec 1-2)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
	2.	7	2 (sec 3)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
10.	1.	7	2 (sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
	2.	7	2 (sec 6-7)	Understanding & Translation of Verses	Past Tense صيغة الجمع للغائب عبدوا
11.	1.	7	3 (sec 1-2)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا

	2.	7	3 (sec 2-3)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا
12.	1.	7	3 (sec 3-4)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا
	2.	7	3 (sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمتكلم عبدنا
13.	1.	7	4 (sec 1-2-3)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمخاطب عبدتم
	2.	7	4 (sec 4-5)	Understanding & Translation of Verses	Past Tense صيغة الجمع للمخاطب عبدتم
14.	1.	7	5-6	Understanding & Translation of Verses Quiz	Past Tense صيغة المتكلم والمخاطب عبدتُ ، عبدتِ
	2.	7	7	Understanding & Translation of Verses	Past Tense صيغة المونث للغائب عبدَتْ
15.	1.	7	8	Understanding & Translation of Verses	Passive Voice (Past Tense) فعل مجهول للمفرد
	2.	7	9	Understanding & Translation of Verses	Passive Voice (Past Tense) فعل مجهول الجمع
16.	1.	8	1-4	Understanding & Translation of Verses	Imperative Verb for singular فعل الأمر للمفرد
	2.	7	5-8	Understanding & Translation of Verses	Imperative Verb for plural فعل الأمر للجمع

Ethics-I URCG-5131 1 (0-1)

1-Course Description

The Ethics-I course is designed to provide students with a comprehensive understanding of ethical principles, practices, and theories in various societal contexts. Throughout this degree program, students will explore the complexities of ethical theories of semitic and non-semitic religions along with decision-making and develop critical thinking skills to navigate moral dilemmas. This course will also enable the students to interact with others religious identities with humanistic, inclusive and holistic approach

2- Learning Objectives

This course aims to:

1. Introduce students to the fundamental concepts, scope, and importance of ethics.
2. Explore the relationship between law, morality, and social values.
3. Develop a clear understanding of virtuous and immoral ethics and their impact on individual and collective life.
4. Study the role of major religious figures in the moral development of human society and enable students to apply ethical principles for personal development, conflict resolution, and social harmony.

3- Learning Outcomes

By the end of the course, students will be able to:

1. Students will be able to identify and analyze major ethical theories, values, and their scope in social and individual life.
2. Differentiate between law and ethics, and analyze their interrelationship.
3. Identify types of virtuous and immoral ethics and assess their social impacts.
4. Examine the ethical teachings of major religions and their relevance in contemporary society.
5. Apply ethical principles to address modern challenges in personal and professional life.

4-Course Structure

1. Interactive lectures, Group discussions and debates
2. Reflection papers and presentations
3. Assignments and Quiz

Course Contents

Unit 1: Introduction and Fundamentals of Ethics

1. Literal and terminological definition of ethics
2. Literal and terminological definition of values
3. Relationship between law and ethics
4. Need, importance, and scope of ethics

Unit 2: Types of Ethics and Their Impact on Society

- Virtuous ethics: concept, types, benefits, and outcomes
- Immoral ethics: concept, types, and harms
- Role of ethics in social refinement and establishment of peace

nit 3: Virtuous Ethics (Akhlaq-e-Hasanah)

- Concept, need, and importance of virtuous ethics
- Scope of virtuous ethics in the light of religions
- Major virtues in revealed and non-revealed religions
- Impact of virtuous ethics on individual and collective life

Unit 4: Immoral Ethics (Akhlaq-e-Razilah)

- Concept of immoral ethics
- Social problems caused by immoral ethics
- Practical consequences of immoral ethics
- Major vices in revealed and non-revealed religions

Unit 5: Role of World Religious Figures in Moral Development

- Prophet Moses (AS): introduction, miracles, and role in moral refinement
- Prophet Jesus (AS): introduction, miracles, and role in moral refinement
- Prophet Muhammad (ﷺ): introduction, miracles, and role in moral refinement

Textbook

1. Izutsu, T. (2002). *Ethico-Religious Concepts in the Qur'an*. McGill-Queen's University Press.

Suggested Readings

1. Gert, B. (2005). *Morality: Its Nature and Justification*. Oxford University Press.
2. MacIntyre, A. (2007). *After Virtue: A Study in Moral Theory*. University of Notre Dame Press.
3. Al-Ghazali, Abu Hamid (2001). *The Alchemy of Happiness*. Islamic Texts Society.
4. Nasr, S. H. (1994). *The Heart of Islam: Enduring Values for Humanity*. Harper One.
5. Beauchamp, T. L., & Childress, J. F. (2019). *Principles of Biomedical Ethics*. Oxford University Press.
6. Hasan, Z. (2010). *Ethics in Islam: Key Concepts and Contemporary Challenges*. Islamic Research Institute.

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Department of Statistics
University of Sargodha

Ethics-II **URCG-5132** **1 (0-1)**

1-Course Description

The course *Ethics-II* is designed to provide students with a deeper understanding of ethical principles and practices from both Semitic and non-Semitic religions, as well as their application in professional and social contexts. Students will engage with Jewish, Christian, Islamic, Hindu, Buddhist, Sikh, Confucian, and Jain ethical traditions. The course emphasizes moral reasoning, decision-making, tolerance, and peacebuilding. It aims to cultivate an inclusive, humanistic, and holistic approach towards ethical living and interfaith engagement.

2- Learning Objectives

The course objectives are to:

1. Understand the fundamental principles and theories of ethics.
2. Introduce the ethical and moral teachings of Judaism, Christianity, Islam, and Hinduism.
3. Explore the ethical teachings of non-Semitic religions such as Buddhism, Sikhism, Confucianism, and Jainism.
4. Develop critical thinking skills to evaluate ethical arguments and theories.
5. Promote ethical leadership and interfaith harmony.

3- Learning Outcomes

By the end of this course, students will be able to:

1. Identify and analyze major ethical theories and teachings from world religions.
2. Understand the role of religions in improving moral values and social behavior.
3. Demonstrate ethical decision-making in various personal and professional contexts.
4. Recognize the impact of ethical decisions on individuals, communities, and society.
5. Apply skills of ethical leadership, including communication, conflict resolution, and inclusive engagement.

4-Course Structure

1. Interactive lectures, Group discussions and debates
2. Reflection papers and presentations
3. Assignments and Quiz

Course Contents

Unit 1: Ethical Teachings of Semitic Religions

- Judaism and its ethical teachings
- Christianity and its ethical teachings
- Islam and its ethical teachings

Unit 2: Ethical Teachings of Non-Semitic Religions

- Hinduism and its ethical teachings
- Sikhism and Buddhism: ethical values and practices
- Confucian and Jain ethical traditions

Unit 3: Professional Ethics

- Ethics for students and teachers
- Ethics in doctor–patient relationships
- Ethics in trader–customer interactions

Unit 4: Concept and Significance of Tolerance

- Definition, need, and importance of tolerance
- Teachings of Semitic religions on tolerance and their contemporary relevance
- Teachings of non-Semitic religions on tolerance and their contemporary relevance

Unit 5: Foundational Values and Ethics for Peacebuilding in Society

- Respect for sacred scriptures, personalities, places of worship, and religious symbols
- Promotion of tolerance and broadmindedness
- Encouragement of dialogue and harmony
- Benevolence towards humanity
- Establishment of justice and fairness
- Patience, forbearance, and forgiveness

Textbook

- Kidder, R. M. (2009). *How Good People Make Tough Choices: Resolving the Dilemmas of Ethical Living*. Harper.

Suggested Readings

1. Barash, D. P., & Webel, C. P. (2014). *Peace and Conflict Studies*. Sage.
2. Smart, N. (1998). *The World's Religions*. Cambridge University Press.
3. Nasr, S. H. (2003). *The Heart of Islam: Enduring Values for Humanity*. HarperOne.
4. Sharma, A. (2006). *Hindu Ethics: Purity, Abortion, and Euthanasia*. SUNY Press.
5. Harvey, P. (2000). *An Introduction to Buddhist Ethics: Foundations, Values and Issues*. Cambridge University Press.
6. Coward, H., & Perkinson, J. (2013). *A Cross-Cultural Dialogue on Ethical Leadership*. Wilfrid Laurier University Press.
7. Confucius. (1998). *The Analects*. Oxford University Press.

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