

 WILEY

Encyclopedia of
BIOSTATISTICS

Second Edition

Editors Peter Armitage Theodore Colton

VOLUME

1

A-CHAP

Contents

VOLUME 1

Aalen–Johansen Estimator	1	Ancillary Statistics	198
Aalen's Additive Regression Model	7	Animal Screening Systems	201
Absolute Risk	12	Antidependence Models	205
Accelerated Failure-time Models	28	Anthropometry	207
Accident and Emergency Medicine	32	Anticipation	212
Accident Proneness	37	Antithetic Variable	214
Actuarial Methods	39	ARMA and ARIMA Models	215
Adaptive Designs for Clinical Trials	51	Artificial Intelligence	222
Adaptive and Dynamic Methods of Treatment Assignment	55	Ascertainment	226
Adaptive Sampling	59	Aspin–Welch Test	233
Additive Hazard Models	65	Association	235
Additive Model	68	Association, Measures of	236
Additive–Multiplicative Intensity Models	69	Assortative Mating	241
Administrative Databases	73	Asymptotic Relative Efficiency (ARE)	243
Admixture in Human Populations	85	Attributable Fraction in Exposed	248
Admixture Mapping	88	Attributable Risk	249
Adoption Studies	90	Autocorrelation Function	262
Adverse Selection	94	Average Age at Death	263
Aging Models	95	Axes in Multivariate Analysis	265
Age-of-onset Estimation	99	Axioms of Probability	266
Age–Period–Cohort Analysis	105	Back-calculation	269
Agreement, Measurement of	123	Backward and Forward Shift Operators	276
Agreement, Modeling of Categorical	137	Bacterial Growth, Division, and Mutation	277
AIDS and HIV	141	Bagging and Boosting	282
Akaike's Criteria	147	Balanced Incomplete Block Designs	284
Algorithm	149	Ban Estimates	286
Allometry	154	Barahona–Poon Test	288
Alternative Hypothesis	156	Barnard, George Alfred	289
Alternative Medicine	157	Bartlett, Maurice Stevenson	290
American Public Health Association	160	Bartlett's Test	292
American Statistical Association	161	Baseline Adjustment in Longitudinal Studies	294
Analysis of Covariance	164	Battery Reduction	298
Analysis of Variance	171	Bayes Factors	301
Analysis of Variance for Longitudinal Data	186	Bayes' Theorem	304
Analytic Epidemiology	189	Bayes, Thomas	304
Analytic Hierarchy Process	190		

Bayesian Approaches to Cure Rate Models	306	Bioassay	451
Bayesian Decision Models in Health Care	313	Bioavailability and Bioequivalence	451
Bayesian Measures of Goodness of Fit	314	Bioequivalence	455
Bayesian Methods	319	Bioinformatics	460
Bayesian Methods for Contingency Tables	326	Bioinformatics in Functional Genomics	461
Bayesian Methods for Model Comparison	334	Biological Assay, Overview	469
Bayesian Methods in Clinical Trials	338	Biological Standardization	483
Bayesian Model Selection in Survival Analysis	343	<i>Biometrical Journal</i>	485
Bayesian Survival Analysis	352	<i>Biometrics</i>	486
Behrens-Fisher Problem	366	<i>Biometrika</i>	488
Benefit/Risk Assessment in Prevention Trials	368	<i>Biostatistics</i>	490
Benjamin, Bernard	375	Biostatistics, History of	490
Berkson, Joseph	376	Biostatistics, Overview	494
Berkson's Fallacy	381	Birth Cohort Studies	503
Bernard, Claude	383	Birth Defect Registries	509
Bernoulli Family	385	Birthweight	511
Bertillon Family	386	Biserial Correlation	512
Beta-binomial Distribution	386	Bivariate Distributions	514
Beta Distribution	389	Bivariate Normal Distribution	516
Bias	390	Blinding or Masking	518
Bias in Case-Control Studies	390	Bliss, Chester Ittner	525
Bias in Cohort Studies	399	Blocking	527
Bias From Diagnostic Suspicion in Case-Control Studies	401	Blood Groups	527
Bias from Exposure Effects on Controls	404	Bonferroni, Carlo Emilio	528
Bias from Exposure Suspicion in Case-Control Studies	404	Bonferroni Inequalities and Intervals	529
Bias from Historical Controls	407	Bootstrap Method	534
Bias from Loss to Follow-up	409	Bootstrapping in Survival Analysis	541
Bias, Nondifferential	409	Bortkiewicz, Ladislaus von	548
Bias from Nonresponse	409	Bradford Hill Lectures	549
Bias in Observational Studies	410	Bradley, Ralph A.	550
Bias, Overview	416	Bradley-Terry Model	551
Bias, Protopathic	423	Branching Processes	558
Bias from Stage Migration in Cancer Survival	424	Breslow-Day Test	560
Bias from Survival in Prevalent Case-Control Studies	426	Broadband Smoothing	561
Bias Toward the Null	426	Brownian Motion and Diffusion Processes	562
Biased Sampling of Cohorts	427	Brownlee, John	566
Binary Data	439	BSE and vCJD	567
Binomial Distribution	447	Burden of Disease	573
		Byar, David P.	577
		Calibration	579
		Call-backs and Mail-backs in Sample Surveys	585
		Cancer Registries	587
		Candidate Gene	600
		Canonical Correlation	600
		Capture-Recapture	614

Cardiology and Cardiovascular Disease	619	Classifications of Medical and Surgical Procedures	837
Case-Cohort Study	628	Clinical Epidemiology	839
Case-Control Study	635	Clinical Signals	843
Case-Control Study, Hospital-based	645	Clinical Significance Versus Statistical Significance	847
Case-Control Study, Nested	646	Clinical Trials of Antibacterial Agents	848
Case-Control Study, Population-based	656	Clinical Trials Audit and Quality Control	852
Case-Control Study, Prevalent	656	Clinical Trials, Early Cancer and Heart Disease	856
Case-Control Study, Sequential	666	Clinical Trials, History of	864
Case-Control Study, Two-phase	670	<i>Clinical Trials</i>	874
Case Fatality	678	Clinical Trials, Overview	875
Case Mix	679	Clinical Trials Protocols	890
Case-only Gene Mapping	680	Cluster Analysis of Subjects, Hierarchical Methods	894
Case Series, Case Reports	682	Cluster Analysis of Subjects, Nonhierarchical Methods	906
Categorical Data Analysis	682	Cluster Analysis, Variables	913
Categorizing Continuous Variables	708	Cluster Randomization	921
Cauchy Distribution	711	Cluster Sampling	934
Causal Direction, Determination	712	Cluster Sampling, Optimal Allocation	939
Causation	713	Cluster Score	941
Cause of Death, Automatic Coding	717	Clustering	942
Cause of Death, Underlying and Multiple	718	Clustering, Complete Linkage	951
Cell Cycle Models	719	Clustering, Single Linkage	952
Censored Data	722	Coarsening at Random	953
Censuses	727	Cochran, William Gemmell	956
Centers for Disease Control and Prevention (CDC)	729	Cochrane, Archibald ('Archie') Leman	958
Central Limit Theory	733	Cochrane Collaboration	959
Centroid Method	737	Cochrane Lectures	963
Chain Binomial Model	737	Cohabitation	964
Chalmers, Thomas Clark	741	Coherence Between Time Series	965
Change-point Problem	743	Cohort Study	968
Chaos Theory	746	Cohort Study, Historical	981
VOLUME 2		Collapsibility	984
Characteristic Function	751	Collinearity	985
Chemometrics	753	Combining <i>P</i> Values	987
Chi-square Distribution	754	Commingle Analysis	991
Chi-square Distribution; Properties	755	Committee of Presidents of Statistical Societies (COPSS)	993
Chi-square, Partition of	760	Communality	994
Chi-square Tests	765	Communicable Diseases	995
Choi-Williams Distribution	779	Community Medicine	1017
Chronic Disease Models	780	Co-morbidity	1017
Chronomedicine	796	Comparative Genomic Hybridization	1019
Circadian Variation	812	Compartment Models	1021
Circular Data Models	815		
Cladistic Analysis	820		
Classification, Overview	826		

Competing Risks	1025	Correspondence Analysis of	
Complex Diseases	1035	Longitudinal Data	1230
Compliance Assessment in Clinical		Cosine of Angle Between Two	
Trials	1038	Vectors	1234
Compliance and Survival Analysis	1040	Cost-Benefit Analysis, Willingness to	
Composite Estimators	1043	Pay	1236
Computer-aided Diagnosis	1045	Cost-effectiveness in Clinical Trials	1241
Computer Algebra	1056	Counter-matching	1248
Computer Architecture and		Counting Process Methods in Survival	
Organization	1061	Analysis	1254
Computer-assisted Interviewing	1068	Covariance Matrix	1268
Computer-intensive Methods	1071	Covariate	1272
Computer Languages and Programs	1077	Covariate Imbalance, Adjustment for	1273
Computerized Therapeutic Decision		Cox, Gertrude Mary	1278
Support	1081	Cox Regression Model	1280
Conception	1086	Cox's Test of Randomness	1294
Conception, Models for	1087	Cramér-Rao Inequality	1295
Conditional Probability	1092	Critical Care	1297
Conditionality Principle	1101	Critical Region	1300
Confidence Intervals and Sets	1102	Cronbach's Alpha	1301
Confidence Intervals, Binomial, when		Crossover Designs	1303
no events are observed	1103	Cross-sectional Study	1319
Confidentiality	1104	Cross-validation	1323
Confidentiality and Computers	1109	Crude Risk	1324
Confidentiality in Epidemiology	1113	Cumulative Hazard	1325
Confounder	1116	Cumulative Incidence	1325
Confounder Summary Score	1116	Cumulative Incidence Rate	1325
Confounding	1118	Cumulative Incidence Ratio	1326
Consistent Estimator	1125	Cure Models	1326
CONSORT	1132	Cutler, Sidney Joshua	1328
Contagious Distributions	1135		
Contingency Table	1138	Data Access, National and	
Continuity Correction	1147	International	1331
Contrasts	1153	Data Archives	1334
<i>Controlled Clinical Trials</i>	1157	Data Management and Coordination	1334
Controls	1159	Data Mining	1344
Convergence in Distribution and in		Data Mining, Software Packages for	1347
Probability	1160	Data Monitoring Committees	1350
Cooperative Cancer Trials	1161	Data Quality in Vital and Health	
Cooperative Heart Disease Trials	1169	Statistics	1355
Cooperative Studies Program, US		Data and Safety Monitoring	1362
Department of Veterans Affairs	1180	Database Systems	1371
Copula	1196	de Finetti, Bruno	1377
Cornfield, Jerome	1198	de Moivre, Abraham	1378
Cornfield's Inequality	1202	Death Certification	1379
Correlated Binary Data	1206	Death Indexes	1380
Correlation	1221	Decision Analysis in Diagnosis and	
Correlational Study	1226	Treatment Choice	1381
Correspondence Analysis	1226	Decision Theory	1393
		Degrees of Freedom	1403

Delayed Entry	1404	Durbin-Watson Test	1559
Delta Method	1409	Dynamic Allocation Index	1560
Demography	1412	Dynamic Population	1561
Dendrogram	1415	Dynamic Programming	1561
Denominator Difficulties	1417		
Density Estimation	1418	Ecologic Fallacy	1567
Density Sampling	1423	Ecologic Study	1567
Dermatology	1423	Econometric Methods in Health Services	1588
Descriptive Epidemiology	1426	Edgeworth Expansion	1596
Design Effects	1426	Edgeworth, Francis Ysidro	1599
Detection Bias	1427	Effect Modification	1600
Diagnosis Related Groups (DRGs):		Efficiency and Efficient Estimators	1603
Measuring Hospital Case Mix	1428	Egret	1609
Diagnostic Test Accuracy	1433	Eigenvalue	1610
Diagnostic Tests, Evaluation of	1433	Eigenvector	1611
Diagnostic Test Evaluation Without a Gold Standard	1439	Eligibility and Exclusion Criteria	1612
Diagnostic Tests, Likelihood Ratio	1441	Eligibility Restriction	1616
Diagnostic Tests, Multiple	1445	Elston-Stewart Algorithm	1617
Diagnostics	1448	EM Algorithm	1618
Differential Error	1453	Empirical Bayes	1631
Diggle-Kenward Model for Dropouts	1453	Endocrinology	1636
Dilution Method for Bacterial Density Estimation	1455	Environmental Epidemiology	1639
Direct and Indirect Effects	1456	Epi Info	1651
Discrete Survival-time Models	1458	Epicure	1652
Discriminant Analysis, Linear	1463	Epidemic Curve	1652
Discrimination and Clustering for Multivariate Time Series	1475	Epidemic Models, Control	1653
Disease-marker Association	1477	Epidemic Models, Deterministic	1658
Disease Registers	1482	Epidemic Models, Inference	1667
Distance Sampling	1488	Epidemic Models, Multi-strain	1672
Distribution-free Methods for Longitudinal Data	1493	Epidemic Models, Recurrent	1674
DNA Sequences	1501	Epidemic Models, Sensitivity Analysis	1680
Dorn, Harold Fred	1507	Epidemic Models, Spatial	1693
Dose-Response	1508	Epidemic Models, Stochastic	1699
Dose-Response Models in Risk Analysis	1508	Epidemic Models, Structured Population	1705
Dose-response in Pharmacoepidemiology	1512	Epidemic Thresholds	1710
		Epidemiology as Legal Evidence	1715
		Epidemiology, Overview	1720
		Epilepsy	1728
		Equivalence Trials	1735
		Errors in the Measurement of Covariates	1741
		Errors in Variables	1748
VOLUME 3		Establishment Surveys With Population Survey-Generated Sampling Frames	1750
Double Sampling	1521	Estimating Functions	1755
Drug Approval and Regulation	1528	Estimation	1766
Drug Interactions	1531		
Drug Utilization Patterns	1533		
Dummy Variables	1554		
Duration Dependence	1555		

Estimation, Interval	1772	Family-based Association for Quantitative Traits	1923
Ethics of Randomized Trials	1775	Family-based Case-Control Studies	1926
Ethnic Groups	1779	Family History Validation	1934
Eugenics	1780	Fan Plot	1937
European Federation of Statisticians in the Pharmaceutical Industry (EFPSI)	1785	Farr, William	1942
European Organization for Research and Treatment of Cancer (EORTC)	1787	Fast Fourier Transform (FFT)	1944
Event History Analysis	1788	Fiducial Probability	1945
Event-related Potential	1799	Fieller's Theorem	1951
Evidence-based Medicine	1802	Finite Population Correction	1952
Exact Inference for Categorical Data	1804	Fisher Lectures	1953
Excess Mortality	1820	Fisher, Ronald Aylmer	1955
Excess Relative Risk	1822	Fisher's Exact Test	1961
Excess Risk	1822	Fixed Effects	1965
Exchangeability	1823	Fixed Population	1965
Exclusion Mapping	1825	Fix-Neyman Process	1965
Expectation	1826	Fleiss, Joseph L.	1969
Expected Number of Deaths	1830	Floating Point Arithmetic	1972
Expected Survival Curve	1832	Follow-up, Active Versus Passive	1977
Experimental Design	1835	Food and Drug Administration (FDA)	1978
Experimental Study	1844	Forecasting	1981
Experiment-wise Error Rate	1845	Forensic Medicine	1984
Expert Witness, Statistician as	1846	Forward Search	1986
Explained Variation Measures in Survival Analysis	1856	Foundations of Probability	1993
Explanatory Variables	1859	Founder Effect	2001
Exploratory Data Analysis	1859	Fractional Factorial Designs	2003
Exponential Distribution	1863	Frailty	2010
Exponential Family	1864	Framingham Study	2016
Exposure Effect	1871	Fraud in Clinical Trials	2023
Extrapolation	1872	Frequency Distribution	2031
Extrapolation, Low Dose	1873	Frequency Matching	2032
Extreme Values	1877		
<i>F</i> Distributions	1883	Galton, Francis	2035
Factor	1887	Galton-Watson Process	2037
Factor Analysis, Confirmatory	1888	Gamma Distribution	2038
Factor Analysis, Overview	1889	Gardner, Martin John	2040
Factor Analysis, Second-order	1897	Gastroenterology	2041
Factor Loading Matrix	1900	Gauss, Carl Friedrich	2043
Factor Scores	1902	Gavarret, Louis-Denis-Jules	2044
Factorial Designs in Clinical Trials	1904	Geisser, Seymour	2045
Factorial Experiments	1911	Gene	2048
False Negative Rate	1916	Gene Conversion	2049
False Positive Rate	1916	Gene-environment Interaction	2049
Familial Correlations	1916	Gene Expression Analysis	2051
		Gene Frequency Estimation	2058
		General Linear Model	2062
		General Practice	2062
		Generalized Additive Model	2069
		Generalized Estimating Equations	2074

Generalized Linear Mixed Models	2085	Grouped Survival Times	2262
Generalized Linear Model	2089	Group-randomization Designs	2267
Generalized Linear Models for Longitudinal Data	2103	Growth and Development	2270
Generalized Maximum Likelihood	2111	Guidelines On Statistical Methods in Clinical Trials	2277
Generating Functions	2113	Guttman Scale	2288
Genetic Correlations and Covariances	2121	Guy, William Augustus	2289
Genetic Counseling	2125	Haenszel, William M.	2291
Genetic Distance	2127	Half-normal Distribution	2293
Genetic Epidemiology	2129	Halley, Edmond	2294
Genetic Heterogeneity	2133	Halperin, Max	2296
Genetic Liability Model	2137	Haplotype Analysis	2299
Genetic Map Functions	2142	Hardy-Weinberg Equilibrium	2307
Genetic Markers	2146	Hawkins, Francis Bisset	2309
Genetic Risk Ratios	2147	Hawthorne Effect	2310
Genetic Transition Probabilities	2151	Hazard Models Based on First-passage Time Distributions	2310
Genitourinary Medicine	2153	Hazard Plotting	2312
Genome-wide Significance	2155	Hazard Rate	2313
Genotype	2158	Hazard Ratio Estimator	2313
Genotyping and Error-checking	2159	Health Care Financing	2315
Geographic Epidemiology	2163	Health Care Technology Assessment	2325
Geographic Patterns of Disease	2178	Health Care Utilization and Behavior, Models of	2331
Geometric Distribution	2184	Health Care Utilization Data	2334
Gerontology and Geriatric Medicine	2185	Health Care Utilization Data, Analysis	2336
Gestational Age	2187	Health Economics	2340
Ghosts	2188	Health Services Data Sources in Canada	2350
Gini, Corrado	2188	Health Services Data Sources in Europe	2357
Gold Standard Test	2189	Health Services Data Sources in the US	2360
Goodman-Kruskal Measures of Association	2190	Health Services Organization in the US	2368
Goodness of Fit	2192	Health Services Research, Overview	2376
Goodness of Fit in Survival Analysis	2201	Health Services Resources, Scheduling	2382
Gosset, William Sealy	2214	Health Statistics, History of	2386
Græco-Latin Square Designs	2215	Health Status Instruments, Measurement Properties of	2393
Gramian Matrix	2218	Health Workforce Modeling	2399
Gram-Schmidt Process	2219	Healthy Worker Effect	2406
Graphical Displays	2220	Hepatology	2411
Graphical Presentation of Longitudinal Data	2244	Heritability	2413
Graunt, John	2247	Heterozygosity	2415
Greenberg, Bernard George	2249	Heterozygosity, Loss of	2416
Greenhouse, Samuel W.	2251	Hidden Markov Models	2420
Greenwood, Major	2253		
Grenander Estimators	2255		
VOLUME 4			
Group Randomized Trials	2257		
Grouped Data	2261		

Hierarchical Models	2428	Intention to Treat Analysis	2566
Hierarchical Models in Genetics	2428	Interaction	2570
Hierarchical Models in Health Service Research	2431	Interaction in Factorial Experiments	2571
Hill, Austin Bradford	2436	Interaction Model	2573
Hill's Criteria for Causality	2439	Interim Analysis of Censored Data	2578
Historical Controls in Survival Analysis	2442	International Agency for Research Against Cancer (IARC)	2584
HLA System	2443	International Biometric Society (IBS)	2585
Hogben, Lancelot Thomas	2444	International Classification of Diseases (ICD)	2586
Horvitz-Thompson Estimator	2445	International Society for Clinical Biostatistics (ISCB)	2589
Hospital Market Area	2446	International Statistical Institute (ISI)	2590
Hotelling, Harold	2447	International Studies of Infarct Survival (ISIS)	2592
Hotelling's T^2	2449	Internet	2597
Human Genetics, Overview	2453	Interpenetrating Samples	2601
Human Genome Project	2456	Interval Censoring	2603
Hypergeometric Distribution	2459	Intervention Analysis in Time Series	2609
Hypothesis Testing	2463	Interviewer Bias	2614
Identifiability	2471	Interviewing Techniques	2615
Identity Coefficients	2472	Inverse Gaussian Distribution	2618
Image Analysis and Tomography	2475	Inverse Probability Weighting in Survival Analysis	2619
Immunotoxicology	2492	Ion Channel Modeling	2625
Importance Sampling	2494	Irwin, Joseph Oscar	2632
Inbreeding	2499	Isolated Populations	2633
Incidence Density	2502	Isotonic Inference	2637
Incidence Density Ratio	2502	Isotonic Regression	2645
Incidence-Prevalence Relationships	2502	Iterative Proportional Fitting	2646
Incidence Rate	2506	Jackknife Method	2651
Incident Case	2506	James-Stein Estimator	2652
Incomplete Block Designs	2506	Jeffreys, Harold	2653
Incomplete Follow-up	2509	Job-exposure Matrices	2654
Incubation Period of Infectious Diseases	2510	Joint Modeling of Longitudinal and Event Time Data	2655
Independence of a Set of Variables, Tests of	2515	<i>Journal of Biopharmaceutical Statistics</i>	2661
Indian Statistical Institute	2517	<i>Journal of Clinical Epidemiology</i>	2661
Infant and Perinatal Mortality	2522	<i>Journal of The American Statistical Association</i>	2665
Infectious Disease Models	2527	<i>Journal of The Royal Statistical Society</i>	2668
Infectivity Titration	2530	J-shaped Distribution	2671
Inference	2533	Kalman Filter	2673
Inference, Foundations of	2545	Kaplan-Meier Estimator	2675
Influence Function in Survival Analysis	2550		
Informatics in the Health Sciences	2552		
Information	2554		
Information Matrix	2556		
Instrumental Variables	2557		
Instrumental Variables in Health Services Research	2561		

Kappa	2682	Linearization Methods of Variance Estimation	2816
Kappa and its Dependence on Marginal Rates	2687	Linkage Analysis, Model-based	2819
Kempthorne, Oscar	2690	Linkage Analysis, Model-free	2831
Kendall, Maurice George	2693	Linkage Analysis, Multipoint	2841
Kin-Cohort Studies	2694	Linkage Analysis, Multivariate	2845
Kolmogorov, Andrey Nikolayevich	2700	Linkage Disequilibrium	2850
Kolmogorov-Smirnov and Cramer-Von Mises Tests in Survival Analysis	2702	Linkage Information Content	2854
Kolmogorov-Smirnov Test	2704	LISREL	2858
Kullback-Leibler Information	2706	Locally Most Powerful Tests	2859
Kurtosis	2708	Location-Scale Family	2861
Lagged Dependent Variables	2711	Logistic Distribution	2864
Lambda Criterion, Wilks'	2712	Logistic Regression	2870
Lancaster, Henry Oliver	2715	Logistic Regression, Conditional	2880
Laplace, Pierre-Simon	2717	Loglinear Model	2886
Large-sample Theory	2717	Lognormal Distribution	2903
Latent Class Analysis	2730	Logrank Test	2905
Latent Period	2733	Lomb Periodogram	2905
Latin Square Designs	2738	Longitudinal Data Analysis, Overview	2906
Lattice Designs	2741	Loss Function	2918
Law of Large Numbers	2743	Louis, Pierre-Charles-Alexandre	2920
Lawley-Hotelling Trace	2746	Machine Learning	2923
League Tables	2748	Magic Square Designs	2924
Least Squares	2751	Mahalanobis Distance	2925
Lehmann Alternatives	2753	Mahalanobis, Prasanta Chandra	2929
Length Bias	2756	Mainland, Donald	2932
Leukemia Clusters	2759	Mallows' C_p Statistic	2933
Level of a Test	2764	Malthus, Thomas Robert	2934
Levinson-Durbin Algorithm	2764	Mantel, Nathan	2935
Lexis Diagram	2767	Mantel-Haenszel Methods	2937
Life Expectancy	2770	Mapping Disease Patterns	2950
Life Table	2770	Marginal Likelihood	2961
Likelihood	2775	Marginal Models	2963
Likelihood Principle	2779	Marginal Models for Multivariate Survival Data	2968
Likelihood Ratio	2782	Marginal Probability	2972
Likelihood Ratio Tests	2783	Marker Processes	2974
Likert Scale	2786	Markov Chain Monte Carlo	2976
Limit Theorems	2787	Markov Chain Monte Carlo, Recent Developments	2984
Linder, Forrest E.	2790	Markov Chains	2994
Lindley's Paradox	2791	Markov Processes	2998
Linear Mixed Effects Models for Longitudinal Data	2792	Martini, Paul	3003
Linear Programming	2797	VOLUME 5	
Linear Rank Tests in Survival Analysis	2802	Matched Analysis	3005
Linear Regression, Simple	2812	Matched Pairs With Categorical Data	3008

Matching	3012	Minimum Variance Unbiased (MVU) Estimator	3251
Matching, Probabilistic	3016	Mining Time Series Data	3253
Maternal Mortality	3021	Misclassification Error	3257
Mathematical Biology, Overview	3025	Misclassification Models	3264
Matrix Algebra	3032	Missing Data	3272
Matrix Computations	3050	Missing Data Estimation, "Hot Deck" and "Cold Deck"	3285
Maximum Likelihood	3058	Missing Data in Clinical Trials	3288
Maxwell, Albert Ernest	3061	Missing Data in Epidemiologic Studies	3291
McKendrick, Anderson Gray	3062	Misspecification	3305
McNemar Test	3062	Mode	3308
Mean	3063	Model Checking	3309
Mean Deviation	3065	Model, Choice of	3311
Mean Square Error	3066	Molecular Epidemiology	3320
Measurement Error in Epidemiologic Studies	3068	Moment Generating Function	3325
Measurement Error in Survival Analysis	3095	Moments	3327
Measurement Scale	3100	Monte Carlo Methods	3329
Median	3103	Moran, Patrick Alfred Pierce	3332
Median Effective Dose	3104	Morbidity and Mortality, Changing Patterns in the Twentieth Century	3333
Median Survival Time	3117	Mortality, International Comparisons	3345
Medical Devices	3119	Most Powerful Test	3348
Medical Ethics and Statistics	3137	Moving Average	3351
Medical Expenditure Panel Survey (MEPS)	3148	Multicenter Trials	3354
Medical Journals, Statistical Articles in	3151	Multidimensional Scaling	3360
Medical Research Council (MRC)	3162	Multilevel Models	3369
Medical Research Council Streptomycin Trial	3163	Multilocus (Gene \times Gene Interaction)	3376
Medicare Data	3166	Multinomial Distribution	3378
Medicines and Healthcare Products Regulatory Agency (MHRA) (Formerly MCA)	3171	Multiple Comparisons	3383
Medico-Legal Cases and Statistics	3173	Multiple Endpoints in Clinical Trials	3393
Mendel's Laws	3179	Multiple Endpoints, Multivariate Global Tests	3397
Merrell, Margaret	3180	Multiple Endpoints, P Level Procedures	3410
Meta-analysis in Epidemiology	3181	Multiple Imputation Methods	3420
Meta-analysis in Human Genetics	3195	Multiple Linear Regression	3428
Meta-analysis of Clinical Trials	3203	Multiple Time Series	3441
Meta-analysis of Diagnostic Tests	3213	Multiplicative Model	3445
Method of Moments	3221	Multiplicity in Clinical Trials	3446
Michaelis-Menten Equation	3224	Multistage Carcinogenesis Models	3451
Midwifery, Obstetrics, and Neonatology	3226	Multistage Sampling	3458
Migrant Studies	3235	Multivariate Adaptive Splines for Analyzing Longitudinal Data	3463
Migration Processes	3243	Multivariate Analysis of Variance	3467
Minimax Theory	3247	Multivariate Analysis, Bayesian	3472
Minimum Therapeutically Effective Dose	3249	Multivariate Analysis, Overview	3480

Multivariate Bartlett Test	3490	Nonparametric Maximum Likelihood	3692
Multivariate Classification Rules:		Nonparametric Methods	3697
Calibration and Discrimination	3491	Nonparametric Regression	3705
Multivariate Distributions, Overview	3497	Nonrandomized Trials	3707
Multivariate Graphics	3511	Nonresponse	3710
Multivariate Median and Rank Sum Tests	3534	Nonsampling Errors	3715
Multivariate Methods for Binary Longitudinal Data	3548	Normal Clinical Values, Design of a Study	3721
Multivariate Multiple Regression	3552	Normal Clinical Values, Reference Intervals for	3726
Multivariate Normal Distribution	3554	Normal Distribution	3732
Multivariate Normality, Tests of	3559	Normal Scores	3735
Multivariate Outliers	3567	Normal Values of Biological Characteristics	3737
Multivariate Survival Analysis	3574	Normality, Tests of	3744
Multivariate t Distribution	3580	Nuisance Parameter	3748
Multivariate Techniques, Robustness	3583		
Multivariate Weibull Distribution	3587	VOLUME 6	
Mutagenicity Study	3590	Null Hypothesis	3751
Mutation	3595	Number Needed to Treat (NNT)	3752
National Center for Health Statistics (NCHS)	3597	Numerical Analysis	3762
National Institutes of Health (NIH)	3603	Numerical Integration	3766
National Surgical Adjuvant Breast and Bowel Project	3608	Numerical Taxonomy	3774
Natural History Study of Prognosis	3619	Nursing	3774
Negative Binomial Distribution	3625	Nutritional Epidemiology	3777
Nelson–Aalen Estimator	3631	Nutritional Exposure Measures	3795
Nephrology	3635	Nyquist Frequency	3797
Network Sampling	3640	Oblimin Rotation	3799
Neural Network	3650	Oblique Rotation	3800
Neurology	3653	Observational Study	3800
Neuropathology	3653	Observer Reliability and Agreement	3801
Neyman, Jerzy	3655	Occupational Epidemiology	3806
Neyman–Pearson Lemma	3660	Occupational Health and Medicine	3825
Nightingale, Florence	3662	Occupational Mortality	3830
Noise and White Noise	3663	Odds	3836
Nominal Data	3664	Odds Ratio	3836
Non-Fourier Waveforms	3667	Office for National Statistics (ONS) (formerly OPCS)	3836
Noncentral t Distribution	3669	Oncology	3837
Noncompliance, Adjustment for	3670	Operations Research	3843
Nondifferential Error	3674	Operations Research, Simulation	3845
Nonignorable Dropout in Longitudinal Studies	3674	Ophthalmology	3849
Nonlinear Growth Curve	3676	Optimal Design	3854
Nonlinear Mixed Effects Models for Longitudinal Data	3679	Optimization and Nonlinear Equations	3857
Nonlinear Regression	3682	Optres Rotation	3863
Nonlinear Time Series Analysis	3688	Order Statistics	3864
		Ordered Alternatives	3867

Ordered Categorical Data	3869	Pharmacoepidemiology, Study Designs	4042
Orders of Magnitude	3878	Pharmacogenetics	4045
Ornstein–Uhlenbeck Process	3878	Pharmacokinetics and Pharmacodynamics	4049
Orthoblique Rotation	3882	Phase I Trials	4062
Orthogonal Designs	3883	Phase II Trials	4067
Orthogonal Rotation	3885	Phase-type Distributions in Survival Analysis	4073
Orthogonality	3886	Physicians' Health Study	4074
Otorhinolaryngology	3892	Pillai's Trace Test	4079
Outcome Measures in Clinical Trials	3898	Pinel, Philippe	4082
Outcomes Research	3904	Pitman Efficiency	4083
Outliers	3908	Placebos	4087
Overdispersion	3913	Point Processes	4095
Overmatching	3919	Poisson Distribution	4109
<i>P</i> Value	3921	Poisson Processes	4113
Pain	3925	Poisson Regression	4115
Paired Comparisons	3929	Poisson Regression in Epidemiology	4124
Paired <i>t</i> Test	3931	Poisson, Siméon–Denis	4127
Pairwise Independence	3933	Polya Process	4128
Panel Study	3934	Polya's Urn Model	4129
Parallel-line Assay	3936	Polygenic Inheritance	4130
Parametric Models in Survival Analysis	3942	Polymorphism	4136
Parental Effects	3952	Polymorphism Information Content	4136
Pareto Distribution	3957	Polynomial Approximation	4140
Parsimony	3958	Polynomial Regression	4143
Partial Likelihood	3959	Polytomous Data	4150
Partially Balanced Incomplete Block Design	3961	Popper, Karl R.	4151
Partner Study	3962	Population Genetics	4158
Pascal, Blaise	3968	Population Growth Models	4161
Paternity Testing	3969	Population-based Study	4162
Path Analysis	3973	Postmarketing Surveillance of New Drugs and Assessment of Risk	4170
Path Analysis in Genetics	3977	Poststratification in Survey Sampling	4172
Pattern Recognition	3990	Power	4177
Pearl, Raymond	3997	Power Divergence Methods	4184
Pearson Distributions	3998	Power Transformations	4186
Pearson, Egon Sharpe	3999	Preclinical Treatment Evaluation	4191
Pearson, Karl	4000	Prediction	4192
Pedigrees, Sequential Sampling	4008	Predictive Modeling of Prognosis	4202
Peirce, Charles Sanders	4009	Predictive Values	4203
Penalized Maximum Likelihood	4011	Prevalence	4203
Penetrance	4014	Prevalence of Disease, Estimation from Screening Data	4209
Person-years at Risk	4017	Prevalence Rate or Ratio	4210
Person-years of Life Lost	4017	Prevalence–Incidence Bias	4211
Petty, William	4018	Prevalent Case	4211
Pharmaceutical Industry, Statistics in	4019	Preventable Fraction	4211
Pharmacoepidemiology, Adverse and Beneficial Effects	4025		
Pharmacoepidemiology, Overview	4031		

Prevention Trials	4213	Quetelet, Lambert-Adolphe-Jacques	
Preventive Medicine	4219		4407
Primary Factors	4222	Queuing Processes	4408
Principal Components Analysis	4224	QUORUM	4414
Principal Coordinates Analysis	4233	Quota, Representative, and Other Methods of Purposive Sampling	4417
Prior Distribution	4237		
Privacy in Genetic Studies	4239		
Probability Sampling	4242	R	4421
Probability Theory	4242	R- and Q-analysis	4422
Procrustes Rotation	4245	Radiation	4424
Product-integration	4246	Radiation Epidemiology	4431
Profile Likelihood	4250	Radiation Hybrid Mapping	4448
Profiling Providers of Medical Care	4252	Radioimmunoassay	4452
Prognosis	4254	Radon-Nikodym Theorem	4456
Prognostic Factors for Survival	4254	Random Coefficient Repeated Measures Model	4457
Program Evaluation	4257	Random Digit Dialing Sampling for Case-Control Studies	4462
Projection Pursuit	4259	Random Effects	4467
Projections: AIDS, Cancer, Smoking	4263	Random Error	4467
Promax Rotation	4267	Random Mixing	4468
Propensity Score	4267	Random Sample	4469
Proportional Hazards, Overview	4272	Random Variable	4469
Proportional Mortality Ratio (PMR)	4272	Randomization	4471
Proportional Mortality Study	4273	Randomization Tests	4471
Proportional-odds Model	4277	Randomized Complete Block Designs	4473
Proportional-odds Regression	4280	Randomized Response Techniques	4479
Proportions, Inferences, and Comparisons	4281	Randomized Treatment Assignment	4486
Proprietary Biostatistical Firms	4294	Randomness, Tests of	4494
Pseudo-likelihood	4297	Range	4496
Pseudo-random Number Generator	4299	Rank Correlation	4498
Psychiatry	4302	Rank Regression	4500
Psychometrics, Overview	4308	Rank Transformation	4503
Pulmonary Medicine	4333	Ranks	4503
		VOLUME 7	
Quality Control in Laboratory Medicine	4339	Rao-Blackwell Theorem	4507
Quality of Care	4348	Rasch Models	4508
Quality of Life	4352	Rasch, Georg	4514
Quality of Life and Health Status	4362	Rate	4515
Quality of Life and Survival Analysis	4368	Ratio and Regression Estimates	4516
Quantal Response Models	4373	Real Time Approach in Survival Analysis	4522
Quantile Regression	4381	Recall Bias	4523
Quantiles	4383	Receiver Operating Characteristic (ROC) Curves	4523
Quartimax Rotation	4384	Record Linkage	4530
Quasi-experimental Design	4385	Reduced Rank Regression	4535
Quasi-independence	4392	Regression	4538
Quasi-likelihood	4395		
Quasi-symmetry	4398		
Questionnaire Design	4402		

Regression to the Mean	4538	Sample Size Determination in	
Regressive Models	4540	Survival Analysis	4711
Relationship Testing	4547	Sample Size in Epidemiologic	
Relative Hazard	4552	Studies	4715
Relative Odds	4553	Sample Surveys in the Health	
Relative Risk	4553	Sciences	4733
Relative Risk Modeling	4553	Sampling Distributions	4752
Reliability Study	4561	Sampling Frames	4754
Remington, Richard D.	4565	Sampling in Developing Countries	4758
Renewal Processes	4566	Sampling With and Without	
Repeated Events	4574	Replacement	4763
Reproduction	4581	Sampling With Probability	
Reproduction Number	4596	Proportional to Size	4764
Resampling Procedures for Sample		Savage, Leonard Jimmie	4770
Surveys	4597	Scan Statistics for Disease	
Residuals	4601	Surveillance	4771
Residuals for Survival Analysis	4609	Scedasticity	4777
Response Effects in Sample Surveys	4615	Schneiderman, Marvin Arthur	4778
Response Surface Methodology	4619	Scientific Method and Statistics	4782
Response Variable	4622	Scores	4787
Restricted Maximum Likelihood	4623	Scree Test	4790
Retrospective Study	4626	Screening Benefit, Evaluation of	4793
Reverse Arrangement Test	4626	Screening Trials	4801
Reversibility	4627	Screening, Models of	4808
Rheumatology	4629	Screening, Overview	4833
Ridge Regression	4633	Screening, Sojourn Time	4841
Risk	4635	Seasonal Time Series	4844
Risk Adjustment	4635	Secondary Attack Rate	4847
Risk Assessment	4636	Segregation Analysis, Classical	4851
Risk Assessment for Environmental		Segregation Analysis, Complex	4854
Chemicals	4639	Segregation Analysis, Mixed Models	4866
Risk Assessment in Clinical Decision		Segregation Ratios	4869
Making	4650	Selection Bias	4869
Risk Factor	4655	Semi-Markov Processes	4870
Risk Set	4656	Semiparametric Regression	4876
Robust Methods in Time Series		Sensitivity	4878
Analysis	4657	Sensitivity Analysis	4879
Robust Regression	4659	Separate Families of Hypotheses	4881
Robustness	4662	Sequence Analysis	4886
Rotation of Axes	4667	Sequential Analysis	4888
Royal Statistical Society	4673	Sequential Linkage Analysis	4893
Roy's Maximum Root Criteria	4676	Sequential Methods for Clinical	
		Trials	4896
Saddlepoint Approximation	4681	Serial Correlation	4905
Salk Vaccine	4682	Serial Dilution Assay	4905
Sample Size Adequacy in Surveys	4689	Serial-sacrifice Experiments	4910
Sample Size Determination	4693	Sex Ratio at Birth	4916
Sample Size Determination for		Shape Analysis	4919
Clinical Trials	4704	Sheppard's Corrections	4928
		Shrinkage	4929

Shrinkage Estimation	4930	Staggered Entry	5139
Sign Tests	4932	Standard Deviation	5144
Signed-rank Statistics	4934	Standard Error	5146
Similarity, Dissimilarity, and Distance Measure	4935	Standard Gamble Technique	5147
Simple Random Sampling	4939	Standard Normal Deviate	5151
Simple Structure	4940	Standardization Methods	5151
Simplex Models	4941	Standardized Coefficients	5164
Simpson's Paradox	4947	Stationarity	5165
Simulation	4949	Statistical Consulting	5166
Simultaneous Confidence Intervals	4953	Statistical Dependence and Independence	5175
Simultaneous Inference	4955	Statistical Forensics	5178
SIR Epidemic Models	4960	Statistical Map	5181
Skewness	4966	<i>Statistical Methods in Medical Research</i>	5186
Slope-Ratio Assay	4968	Statistical Review for Medical Journals	5186
Slutzky-Yule Effect	4971	Statistical Review for Medical Journals, Guidelines for Authors	5190
Small Area Estimation	4972	Statistical Review for Medical Journals, Journal's Perspective	5193
Small Area Variation Analysis	4977	Statisticians in the Pharmaceutical Industry (PSI)	5196
Smith, Cedric Austen Bardell	4979	<i>Statistics in Medicine</i>	5197
Smoking and Health	4979	Statistics, Overview	5198
Smoothing Hazard Rates	4986	StatXact	5207
Smoothing Methods in Epidemiology	4997	Stereology	5208
Snedecor, George Waddell	5009	Stimulus-Response Studies	5217
Snowball Sampling	5011	Stochastic Approximation	5219
Social Classifications	5012	Stochastic Limit and Order Relations	5222
Social Sciences	5013	Stochastic Processes	5223
Society for Clinical Trials	5017	Stocks, Percy	5251
Software for Clinical Trials	5019	Stratification	5252
Software for Genetic Epidemiology	5040	Stratified Sampling	5252
Software for Sample Survey Data	5050	Stratified Sampling, Allocation in Stroke	5259
Software for Sample Survey Data, Misuse of Standard Packages	5057	Structural and Sampling Zeros	5262
Software Reliability	5064	Structural Equation Models	5267
Software, Biostatistical	5070	Structural Nested Failure Time Models	5278
Software, Epidemiological	5077	Structural Time Series Models	5295
Soper, Herbert Edward	5087	VOLUME 8	
Spatial Models for Categorical Data	5087	Studentization	5305
Spearman Rank Correlation	5095	Studentized Range	5305
Specificity	5101	Student's t Distribution	5307
Spectral Analysis	5101	Student's t Statistics	5308
Sphericity Test	5114	Study Population	5308
Spiegelman, Mortimer	5115	Subjective Probability	5309
Spline Function	5116		
Spline Smoothing	5118		
Split Plot Designs	5124		
S-PLUS and S	5129		
Sports Medicine	5130		
Spreadsheet	5132		
Square Contingency Table	5134		

Sufficiency	5310	Travel Medicine	5496
Sufficient Statistic	5311	Treatment Delay	5498
Summary Measures Analysis of Longitudinal Data	5316	Treatment-covariate Interaction	5499
Superpopulation Models in Survey Sampling	5319	Trees, Probabilistic Functional	5502
Support Vector Machines	5328	Tree-structured Statistical Methods	5504
Surgery	5335	Trend Test for Counts and Proportions	5516
Surrogate Endpoints	5341	Trigonometric Regression	5527
Surveillance of Diseases	5347	Trimming and Winsorization	5531
Surveys, Health and Morbidity	5353	Truncated Survival Times	5534
Survival Analysis, Overview	5368	Tukey, John Wilder	5539
Survival Analysis, Software	5377	Tumor Growth	5546
Survival Distributions and Their Characteristics	5382	Tumor Incidence Experiments	5548
Synergy of Exposure Effects	5389	Tumor Modeling	5560
Systematic Error	5394	Turnbull Estimator	5564
Systematic Sampling Methods	5394	Twin Analysis	5568
Target Population	5399	Twin Concordance	5581
Teaching Medical Statistics to Statisticians	5400	Twin Registers	5584
Teaching Statistics to Medical Students	5404	Two-by-Two Table	5586
Teaching Statistics to Physicians	5410	Two-mutation Carcinogenesis Model	5590
Telephone Sampling	5414	Two-phase Sampling	5595
Teratology	5428	Two-stage Least Squares Regression	5599
Textbooks in Clinical Trials	5437	Type-specific Covariates in Survival Analysis	5601
Thiele, Thorvald Nicolai	5447	Unbiasedness	5603
Tied Survival Times	5448	Uniform Distribution	5606
Time Lag Effect	5450	Uniform Random Numbers	5607
Time Origin, Choice of	5450	Unimodality	5611
Time Series	5451	Union Internationale Contre le Cancer (UICC)	5613
Time Series Regression	5454	Union-Intersection Principle	5613
Time Series Similarity Measures	5457	Unit of Analysis	5615
Time to Pregnancy	5460	Univariate Response	5619
Time Trade-off Technique	5462	University Group Diabetes Program (UGDP)	5619
Time-by-time Analysis of Longitudinal Data	5466	Up-and-Down Method	5628
Time-dependent Covariate	5467	U-Shaped Distribution	5631
Time-varying Treatment Effect	5471	U-Statistics	5632
Tolerance Interval	5477	Utility	5635
Tolerance Region	5482	Utility in Health Studies	5638
Total Time on Test	5483	Vaccine Studies	5649
Transfer Function Models	5485	Validation Study	5656
Transformations	5488	Validity and Generalizability in Epidemiologic Studies	5662
Transfusion Medicine	5489	Variable Selection	5669
Transition Models for Longitudinal Data	5492	Variance	5674
Transplantation	5493	Variance Component Analysis	5676
		Variance Components	5685

Varimax Rotation	5697	Worcester, Jane	5754
Variogram	5698	World Health Organization (WHO): Biostatistics and Epidemiology	5755
Vector Field Plot	5700	World Health Organization (WHO): Global Health Situation	5756
Viral Population Growth Models	5704		
Vital Statistics, Overview	5711		
Wald, Abraham	5719	X-Linkage	5765
Wald's Identity	5722	Yates, Frank	5770
Wavelet Analysis	5723	Yates's Algorithm	5772
Weibull Distribution	5724	Yates's Continuity Correction	5776
Weighted Distributions	5725	Youden Squares and Row-Column Designs	5778
Wigner-Ville Distribution	5730	Yule Process	5783
Wilcoxon, Frank	5731	Yule, George Udny	5784
Wilcoxon-Mann-Whitney Test	5732	Yule-Walker Equations	5786
Wilcoxon Signed-rank Test	5735		
Wilcoxon-type Scale Tests	5737	Z Analysis	5786
Window Estimate	5742	Zelen Leadership Award and Lecture	5789
Wishart Distribution	5743	Zero Padding	5789
Women's Health Initiative: Statistical Aspects and Selected Early Results	5744	Zygosity Determination	5790