

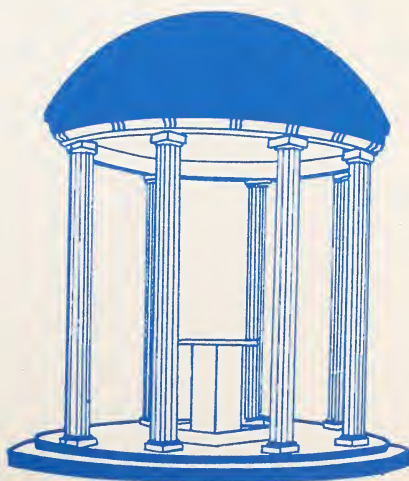
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RECORD OF THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

August, 1976

Issue 1976-1978

Department of Statistics



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**RECORD OF
THE UNIVERSITY OF NORTH CAROLINA AT
CHAPEL HILL**

August, 1976

Number 839

**DEPARTMENT OF
STATISTICS**

**The University of North Carolina
at Chapel Hill**

**Announcements for 1976-1977 and
1977-1978**

THE UNIVERSITY OF NORTH CAROLINA

Sixteen Constituent Institutions

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RAYMOND HOWARD DAWSON, B.A., M.A., Ph.D., Vice President—
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ARNOLD KIMSEY KING, A.B., A.M., Ph.D., Assistant to the President
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Affairs
RICHARD H. ROBINSON, JR., A.B., LL.B., Assistant to the President
ROBERT W. WILLIAMS, A.B., M.A., Ph.D., Associate Vice President—
Academic Affairs

The University of North Carolina was chartered in 1789 and opened its doors to students at its Chapel Hill campus in 1795. Throughout most of its history, it has been governed by a Board of Trustees chosen by the Legislature and presided over by the Governor. During the period 1917-1972, the Board consisted of one hundred elected members and a varying number of *ex officio* members.

By act of the General Assembly of 1931, without change of name, it was merged with The North Carolina College for Women at Greensboro and The North Carolina State College of Agriculture and Engineering at Raleigh to form a multicampus institution designated The University of North Carolina.

In 1963 the General Assembly changed the name of the campus at Chapel Hill to The University of North Carolina at Chapel Hill and that at Greensboro to The University of North Carolina at Greensboro and, in 1965, the name of the campus at Raleigh was changed to North Carolina State University at Raleigh.

Charlotte College was added as The University of North Carolina at Charlotte in 1965, and, in 1969, Asheville-Biltmore College and Wilmington College became The University of North Carolina at Asheville and The University of North Carolina at Wilmington respectively.

A revision of the North Carolina State Constitution adopted in November 1970 included the following: "The General Assembly shall maintain a public system of higher education, comprising The University of North Carolina and such other institutions of higher education as the General Assembly may deem wise. The General Assembly shall provide for the selection of trustees of The University of North Carolina. . . ." In slightly different language, this provision had been in the Constitution since 1868.

On October 30, 1971, the General Assembly in special session merged, without changing their names, the remaining ten state-supported senior institutions into the University as follows: Appalachian State University, East Carolina University, Elizabeth City State University, Fayetteville State University, North Carolina Agricultural and Technical State University, North Carolina Central University, North Carolina School of the Arts, Pembroke State University, Western Carolina University, and Winston-Salem State University. This merger, which resulted in a statewide multicampus university of sixteen constituent institutions, became effective on July 1, 1972.

The constitutionally authorized Board of Trustees was designated the Board of Governors, and the number was reduced to thirty-two members elected by the General Assembly, with authority to choose their own chairman and other officers. The Board is "responsible for the general determination, control, supervision, management, and governance of all affairs of the constituent institutions." Each constituent institution, however, has its own board of trustees of thirteen members, eight of whom are appointed by the Board of Governors, four by the Governor, and one of whom, the elected president of the student body, serves *ex officio*. The principal powers of each institutional board are exercised under a delegation from the Board of Governors.

Each institution has its own faculty and student body, and each is headed by a chancellor as its chief administrative officer. Unified general policy and appropriate allocation of function are effected by the Board of Governors and by the President with the assistance of other administrative officers of the University. The General Administration office is located in Chapel Hill.

The chancellors of the constituent institutions are responsible to the President as the chief administrative and executive officer of The University of North Carolina.

UNIVERSITY CALENDAR

1976-1977

SUMMER SESSION, 1976

First Term

May 24, Monday	Registration
May 25, Tuesday	First day of classes.
May 26, Wednesday	Last day of late registration.
June 25, Friday	Last day of classes.
June 28-29, Monday-Tuesday	Final examinations.

Second Term

July 6, Tuesday	Registration.
July 7, Wednesday	First day of classes.
July 8, Thursday	Last day for late registration.
August 6, Friday	Last day of classes.
August 9-10, Monday-Tuesday	Final examination.

Short terms and institutes will be offered during a term June 14-July 1 and July 1-July 6. A list of courses offered during these terms will be included under the section *Special Features* in the Summer Session catalogue.

FALL SEMESTER, 1976

August 18, Wednesday	Fall semester opens.
August 20, Friday, 12:00 Noon	Residence halls open for freshmen.
August 21, Saturday	Orientation and placement of all new freshmen according to schedule to be announced.
August 22, Sunday	Residence halls open for transfer students.
August 23, Monday	Residence halls open for returning students.
August 23-25, Monday-Wednesday	Registration according to schedule to be announced.
August 26, Thursday	Classes begin for all students. Late registration begins. Fee of \$5.00 charged for late registration.
August 31, Tuesday	End of late registration and change in schedules. No registration accepted after this date.
September 6, Monday	Holiday, Labor Day.
October 11, Monday	Progress reports for freshmen due.
October 12, Tuesday	University Day (classes dismissed 11:00-1:00).

October 12, Tuesday	Last day for filing application with Dean for degree to be awarded in December.
October 27, Wednesday	Last day for withdrawal without semester in residence; and for refund of fees.
November 1-5, Monday-Friday	Preregistration for spring semester.
November 24, Wednesday, 1:00 P.M.	Instruction ends for Thanksgiving recess.
November 29, Monday, 8:00 A.M.	Instruction resumes.
December 7, Tuesday	Fall semester classes end.
December 8, Wednesday	Reading Day.
December 9, Thursday	Fall semester examinations begin.
December 18, Saturday	Fall semester examinations end.

SPRING SEMESTER, 1977

January 9, Sunday	Semester opens.
January 9, Sunday, 1:00 P.M.	Residence halls open for new students.
January 10, Monday, 12:00 Noon	Residence halls open for returning students.
January 10, Monday, 8 A.M.-12:00 Noon	Registration for new students.
January 10-11, Monday-Tuesday	Schedule changes for returning students.
January 12, Wednesday	Classes begin for all students. Late registration begins. Fee of \$5.00 charged for late registration.
January 17, Monday	End of late registration and change in schedules. No registration accepted after this date.
February 11, Friday	Last day for filing applications with Dean for degree to be awarded in May.
March 7, Monday, 8:00 A.M.	Spring vacation begins.
March 14, Monday, 8:00 A.M.	Instruction resumes.
March 15, Tuesday	Last day for withdrawal without semester in residence; and for refund of fees.
April 11, Monday	Holiday, Easter Monday.
April 18-22, Monday-Friday	Preregistration for summer and fall.
April 28, Thursday	Last day of classes for the spring semester.
April 29, Friday	Reading Day.
May 2, Monday	Spring semester examinations begin.
May 11, Wednesday	Spring semester examinations end.
May 15, Sunday	Commencement.

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INTRODUCTION

This brochure briefly describes the graduate programs offered by the Department of Statistics of the University of North Carolina at Chapel Hill.

The material in this brochure is a supplement to that found in the Graduate School Catalog of the University; some of the regulations of the Graduate School have been omitted here. Requests for a Graduate School Catalog should be sent to the Graduate School, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27514.

**THE UNIVERSITY OF NORTH CAROLINA
AT CHAPEL HILL**

NELSON FEREBEE TAYLOR, LL.B., *Chancellor*

SUSAN H. EHRINGHAUS, J.D., *Assistant to the Chancellor*

JOHN PARKHILL EVANS, Ph.D., *Assistant to the Chancellor*

SARAH VIRGINIA DUNLAP, B.S., *Secretary to the University*

C. HUGH HOLMAN, Ph.D., *Special Assistant to the Chancellor*

DONALD ARTHUR BOULTON, Ed.D., *Dean of Student Affairs*

WILLIAM WILFRED COBEY, JR. *Director of Athletics*

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Chancellor*

WILLIAM FREDERICK LITTLE, Ph.D., *Vice Chancellor, Develop-
ment and Public Service*

JOHN CHARLES MORROW III, Ph.D., *Provost*

CECIL GEORGE SHEPS, M.D., *Vice Chancellor, Health Sciences*

STATISTICS FACULTY BIOGRAPHIES

RAJ CHANDRA BOSE, *Kenan Professor Emeritus*. B.A. (Hons., 1922), Punjab University; M.A. (1924), Delhi University; M.A. (1927), D.Litt. (1947), Calcutta University. Member, National Academy of Sciences, International Statistical Institute. Fellow, Institute of Mathematical Statistics, National Institute of Science (India); Honorary Fellow, Royal Statistical Society. Member of Editorial Board, *Journal of Combinatorial Theory*.

CHARLES R. BAKER, *Professor*. B.S. (1957), University of Southwestern Louisiana; M.S. (1963), Ph.D. (1967), University of California at Los Angeles.

Major Areas of Interest: Statistical Communication Theory, Stochastic Processes.

INDRA MOHAN CHAKRAVARTI, *Professor*. B.Sc. (1948), M.Sc. (1950), D. Phil. (1958), University of Calcutta. Fellow, Institute of Mathematical Statistics; Member, International Statistical Institute. *Major Areas of Interest:* Design of Experiments, Combinatorics, Information and Coding Theory.

WASSILY Hoeffding, *Kenan Professor*. Ph.D. (1940), University of Berlin. Member, National Academy of Sciences, International Statistical Institute. Fellow, Institute of Mathematical Statistics, American Statistical Association.

Major Area of Interest: Statistical Inference.

- NORMAN LLOYD JOHNSON, *Professor*. B.Sc. (Math., 1936), B.Sc. (Stat., 1937), M.Sc. (1938), Ph.D. (1948), D.Sc. (1963), University College, London. Fellow, Royal Statistical Society, Institute of Mathematical Statistics, Institute of Actuaries, American Statistical Association. Member, International Statistical Institute.
Major Areas of Interest: Multivariate Analysis, Statistical Inference.
- MALCOLM ROSS LEADBETTER, *Professor*. B.Sc. (1953), M.Sc. (1955), University of Otago (New Zealand); B.A. (1958), M.A. (1962), University of Cambridge; Ph.D. (1963), University of North Carolina. Member, International Statistical Institute, Fellow American Statistical Association.
Major Areas of Interest: Probability, Stochastic Processes.
- GORDON D. SIMONS, *Professor and Chairman*. B.A. (1960), M.A. (1964) Ph.D. (1966), University of Minnesota.
Major Areas of Interest: Sequential Analysis, Statistical Inference, Probability Theory.
- WALTER LAWS SMITH, *Professor*. B.A. (1947), M.A. (1951), Ph.D. (1953), University of Cambridge. Fellow, Cambridge Philosophical Society, Royal Statistical Society, Institute of Mathematical Statistics, American Statistical Association, Member of International Statistical Institute.
Major Areas of Interest: Probability, Stochastic Processes.
- STAMATIS CAMBANIS, *Associate Professor*. B.S. (1966), National Technical University (Athens, Greece); M.A. (1968), Ph.D. (1969), Princeton University.
Major Areas of Interest: Statistical Communication Theory, Stochastic Processes.
- DOUGLAS G. KELLY, *Associate Professor*. A.B. (1961), Princeton University; A.M. (1967), Ph.D. (1967), Indiana University.
Major Areas of Interest: Probability, Combinatorics, Real Analysis.
- KEMPTON J.C. SMITH, *Associate Professor*. B.Sc. (Hons.) 1964, Carleton University; Ph.D. (1968), University of North Carolina
Major Areas of Interest: Design of Experiments, Applied Statistics.
- ²EDWARD J. WEGMAN, *Associate Professor*. B.S. (1965), St. Louis University; M.S. (1967), Ph.D. (1968), University of Iowa.
Major Areas of Interest: Isotonic Inference, Time Series Analysis, Statistical Computing.
- RAYMOND J. CARROLL, *Assistant Professor*. B.A. (1971), University of Texas at Austin; M.A. (1972), Ph.D. (1974), Purdue University.
Major Areas of Interest: Ranking and Selection, Sequential Analysis, Statistics of Accounting.

1. Absent on leave, Spring 1977.

2. Absent on leave, 1976-1977.

THE UNIVERSITY AND CHAPEL HILL

The University of North Carolina at Chapel Hill is the oldest state supported university in the United States, first opening its doors in 1795. It is part of The University of North Carolina, which has 16 campuses across the state. Chapel Hill—a cosmopolitan town of about 25,000—blends a mild climate, a relaxed southern atmosphere, pine-covered hills and the charm of a college town with such cultural advantages as an excellent theater, a symphony orchestra, a planetarium, and an art museum. Most of the larger cities in North Carolina are nearby; the Carolina beaches, the Cape Hatteras National Seashore, the Great Smoky Mountains National Park and the Blue Ridge Mountains are but a few hours drive away. Basketball, football, year-round golf, swimming and other athletic attractions are always in abundance in Chapel Hill.

The University, which now has about 20,000 students, is one of the South's leading academic institutions and prides itself on being among the front rank of American universities. Students come to Chapel Hill from all over the world. Within the University, several departments, including the Department of Statistics, have received international recognition.



THE DEPARTMENT OF STATISTICS

The Department of Statistics is a part of the Graduate School of the University of North Carolina at Chapel Hill. It is primarily concerned with graduate teaching and research in the mathematical theory of statistics and probability, and in related areas such as applied probability, communication theory, combinatorics and operations research. In addition to the M.S. and Ph.D. programs, the Department offers an undergraduate program in statistics and courses suitable for graduate and undergraduate students majoring in other areas. The Department works cooperatively with other organizations in providing statistical services for the University.

The Department of Statistics, through its emphasis on graduate training and research in the mathematical theory of statistics, has, since its organization in 1946, attained the stature of being one of the world's foremost centers of statistical research. Since 1948, over 100 Ph.D. degrees in Statistics have been awarded. Holders of these degrees have assumed positions of responsibility in many important statistical organizations, including the Executive Secretary and Program Secretary of the Institute of Mathematical Statistics, the Editor of the *Annals of Mathematical Statistics*, and the chairmen of the Departments of Statistics at several American universities. In addition, many professors at leading universities in the United States and abroad and senior statisticians in government and industry received their doctoral training in the Department of Statistics at the University of North Carolina.

Much fundamental work in experimental design, nonparametric inference, sequential analysis, renewal theory, coding theory, estimation, and hypothesis testing has originated here. The Institute of Statistics Mimeograph Series, which now includes over 1000 titles, contains the first results of many of the fundamental lines of research in the subject of mathematical statistics as it exists today.

An attractive feature of the Department is its close connection with various other centers of statistical activity within the University. The Department of Statistics on the Raleigh campus, and the Department of Biostatistics, at Chapel Hill, both offer a wide range of courses in applied statistics which may be combined with the more theoretically-oriented courses in the Department of Statistics to suit individual needs and interests. The Departments of Mathematics, Computer Science, City and Regional Planning, Economics, and the Psychometric Laboratory, among others, provide opportunities for further training in areas related to statistics.

The Department is located in two adjacent air-conditioned buildings. Most of the faculty and secretarial offices are in Phillips Hall, while classrooms, seminar rooms research faculty and research assistant offices, as well as a comfortable lounge, are located in Smith Building.

The Mathematics-Physics-Statistics-Computer Science Library in Phillips Hall maintains an extensive collection of books and journals pertaining to statistics. Graduate students have unlimited access to this library 24 hours a day. Additional materials in the main University Library are also available.

The University Computation Center is located in the basement of Phillips Hall. Batch process programs may be submitted there to be run on an IBM 360 Model 75, or an IBM 370 Model 155 II, which are located at the Computation Center, or an IBM 370 Model 165, which is located in the nearby Research Triangle Institute. In addition the Department of Statistics has two terminals where faculty and students may program in conversation mode using APL 370, or a number of other programming languages.

Colloquia for presentation of research in both mathematical and applied statistics are held by the Departments of Statistics and Biostatistics. The Statistics Colloquium, which usually meets on alternate Monday afternoons throughout the academic year, is a forum for the presentation and discussion of recent developments and new ideas by statistics faculty, visiting scholars, and student. All students are expected to attend the colloquia.



ADMISSION AND FINANCIAL ASSISTANCE

Prerequisites

Admission to the Graduate School is necessarily a selective process. Only applicants with academic records of high quality should seek admission. The minimal requirement is a Bachelor of Arts or Bachelor of Science degree from an accredited college or university in this country with an average grade of B or better in the major subject, or its equivalent—based on a four year curriculum—in a foreign institution.

The graduate curriculum in the Department of Statistics places strong emphasis on the mathematical theory of probability and statistics. A sound mathematical preparation is thus an essential prerequisite for admission. An applicant's mathematical background should include a one year course in advanced (multivariable) calculus or real analysis, and at least a one semester course in matrix algebra. Introductory courses in probability and statistics are desirable but not required.

Procedures

Application forms for admission and/or financial aid may be obtained by writing either to the Department of Statistics or to the Graduate School. A complete application must include at least the following:

1. The completed application forms in duplicate.
2. Two official transcripts of all previous undergraduate and graduate work.
3. Three references in duplicate (forms provided) from people familiar with the applicant's academic achievement and potential.
4. A nonrefundable application fee of \$10. An applicant who has been offered admission reserves his place by the payment of a \$25.00 non-refundable deposit which is credited toward the first semester's tuition.

In addition to the above the Department of Statistics strongly recommends that applicants submit the following material:

5. Test scores for both the Aptitude and Advanced Mathematics Graduate Record Examinations
6. A supplementary sheet providing brief course descriptions, including text titles where applicable, of all previous undergraduate and graduate courses in (a) probability and statistics, (b) mathematics above the level of elementary calculus, and (c) other courses of a mathematical nature, such as computer science, mathematical physics, etc.

The Graduate Record Examinations are given at regular intervals throughout the academic year at most universities in this country and in many countries abroad. Information about these examinations can usually be obtained from the dean's office of colleges or universities in this country, or by writing to Educational Testing Service, Princeton, New Jersey.

Applicants for financial aid should take the examinations no later than December for admission in the succeeding fall semester.

Students whose native language is not English are required to take the Test of English as a Foreign Language Examination (TOEFL) administered by the Educational Testing Service.

Financial Assistance

The Department of Statistics offers a number of assistantships to graduate students each year. These awards presently carry a stipend of \$3100 for the first year and \$3200 per academic year thereafter and, according to University practice, the eligibility for in-state tuition status. Assistantships are renewable each academic year, contingent on satisfactory progress toward a degree and availability of funds. Normally assistantships are not awarded to a student beyond his fourth academic year and are not offered during the summer.

Applicants for financial aid are considered also for various fellowships and service awards for which recipients are selected on a competitive university-wide basis by the Graduate School. These awards include University Graduate Fellowships, National Defense Education Act Title IV Fellowships, George E. Nicholson, Jr., Fellowships, and Morehead Fellowships. Stipends range from \$3000 to \$4000 for the academic year with tuition included in most cases.

Application for admission and financial aid may be made simultaneously simply by indicating on the admission application form a desire to be considered for financial aid.

Deadlines

The Department of Statistics does not admit students in the summer sessions and rarely admits students in the spring semester. The deadlines for application for admission in the fall semester are

- (a) February 1 for admission and financial aid.
- (b) July 1 for admission only.

Further Information

For further information about graduate programs, admission procedures, and financial aid, address inquiries to

Director of Graduate Admissions
Department of Statistics
University of North Carolina
Chapel Hill, North Carolina 27514

The Department of Statistics welcomes applications for admission and aid from members of minorities. Admission and aid are awarded without consideration of race, sex, or creed.

Ph.D. PROGRAM

Students wishing to obtain a Ph.D. in statistics normally first complete the M.S. program, if they do not already have an M.S. in statistics, and do at least one further semester of course work before embarking on research leading to the doctoral dissertation. The time needed to complete the dissertation varies considerably, depending on the student's background and initiative. However, a prospective Ph.D. candidate should normally plan to allot at least one year to this research phase of his work.

All graduate students in the Department of Statistics are required to perform some duties related to their academic program, such as grading, teaching, consulting, as part of their graduate education. Assignments are carefully controlled to avoid delaying academic progress.

Course Work for the Ph.D. Degree

The philosophy of the Department is that its Ph.D. graduates should be "broadly based" in statistical theory and practice, and at the same time be able to conduct basic research in some special area. In order to achieve this, course work consisting of a total of approximately 60 semester hours is normally required of students entering with a B.S. or equivalent degree. This will typically be reduced for students with prior graduate study in statistics or in a supporting area.

In his first year a student is normally required to take a standard 24 semester hours of course work involving the mathematical methods of statistics, probability, statistical theory and practice (see below). This year of course work provides a broad base of coverage in probability and statistical areas. Courses in this series are normally omitted only on the grounds of prior knowledge and demonstrated competence in the subject material.

In his second year a student takes advanced courses in which he may specialize his area of interest. Six main areas of specialization are currently recognized: Inference, Probability, Design of Experiments, Multivariate Analysis, Communication Theory, Operations Research. A student wishing to specialize in a given area should take advanced courses in his area during his second and third years, prior to and during his research for his dissertation. In addition a student must take a minimum of three advanced courses selected from at least two other areas of statistics in order to broaden his area of competence. A detailed listing of appropriate courses for students in each area of specialization is given on page 15. Except for the first year courses, the programs listed (especially the "broadening" courses, at most one of which may be taken outside the department) are by no means inflexible. They are given as examples of typical curricula.

1. First year (all students)							
Fall	102, 112, 129, 134					Spring	111, 132, 135, 150
2. Following years (by area)							
						<i>"Major"</i>	<i>"Broadening"</i>
A. Inference	220, 221, 222, 231, 232					210, 235, 260	(140)
B. Design	210, 251, 254, 255, 260					180, 222, 220	
C. Multivariate Analysis	260, 261, 262, 210, 200					180, 222, 220	
D. Probability	231, 235, 237, 331					220, 222, 252	
E. Communication Theory	140, 142, 242, 245, 235					231, 220, 252	
F. Operations Research	180, 181, 220, 232, 280					252, 210 (260), 140	

All Ph.D. students are required to register for four semester hours of the seminar courses 300, 301 and for at least three semester hours of dissertation registration 394.

Fifteen hours of course work, at least nine of which must be taken from courses in other departments, are required for all students as a "supporting program." The content of this program must be approved by this department. The supporting program may be regarded as a "formal minor" on approval of the minor department (or departments). Some of this work may be "transferred" from graduate work at another institution.

Written Examinations

Doctoral students are required to pass the basic written examinations, consisting of three parts, each four hours in length, covering the material in the first year courses. These are normally taken early in the fall semester of the second year. Parts I and II test a student's knowledge of theory and ability to solve mathematically formulated problems. Part III tests a student's ability to perform statistical calculations with data, and to work with practical problems which are not mathematically formulated. (Students with an undergraduate major in engineering, and with sufficient background in complex variables and Fourier theory, may choose to be tested on Statistics 140, 142 and 252 instead of the first year courses 111, 102 and 150.)

Oral Examinations

A doctoral candidate during the early stages of his research program must prepare an essay which shall include a description of his proposed dissertation topic, a review of the literature, and a bibliography connected with his proposed research and submit it to his doctoral examination committee for approval. Upon approval of the essay a preliminary oral examination (second doctoral examination) is arranged for the candidate. At this examination, the student will be questioned orally on his minor or supporting program and on any deficiencies in his major as disclosed by the written examinations. He will then describe his thesis proposal and answer questions on it. A Ph.D. student who has passed this oral examination and

who wishes to obtain an M.S. degree may do so without having to take the final oral examination normally required for the M.S. degree.

The candidate will submit his dissertation when ready to the members of his examination committee. At the final oral examination, the candidate will present his research results and conclusions and will answer questions on these.

Foreign Language Requirements

A Ph.D. student is required to have a high degree of proficiency in one scientifically useful language other than English. A student demonstrates his proficiency by first taking a GSFLT (Graduate School Foreign Language Test) conducted by the ETS and scoring in the upper quartile among the Natural Sciences candidates, and then passing a departmental test on his ability to translate with the help of a dictionary. In exceptional cases, these requirements may be modified. French, German and Russian are considered acceptable as foreign languages. Other languages will be considered on an individual basis by the Examination Committee, on application by the student. Other languages will not be considered without strong supporting evidence of scientific usefulness in the student's professional specialty.

M.S. PROGRAM

The Department provides a wide variety of course sequences leading to the Master's (M.S.) degree. The basic philosophy is that this program should provide a broad training in general statistical theory and practice, with significant advanced work in some more specialized area. The program is designed to be very flexible, the course work being tailored closely to fit each individual student's needs. Three semesters are regarded as normal time for the completion of all requirements for this degree.

Course Work for the M.S. Degree

The M.S. degree in statistics requires the satisfactory completion of 30 hours of course work, of which 18-21 must be in the Department of Statistics, and 9-12 in an approved minor, or supporting program. Departmental policy is that the course work will normally include either Statistics 126, 127, or Statistics 134, 135 (statistical theory), Statistics 102 (statistical applications), and either three courses in a single area of specialization or two courses in each of two areas of specialization. Examples of typical areas of specialization and courses included in these are:

Probability Theory	111	112	132	231
Statistical Analysis	150	210	171	
Operations Research	180	181	280	
Applied Probability	129	133	280	
Multivariate Analysis	150	160	210	
Design of Experiments	150	160	210	251
Combinatorial Analysis	150	156	158	251
Communication Theory	140	142	252	

These course requirements are given as guidelines, and may be varied in individual cases by departmental consent.

The 9-12 hours required in the "minor field" may be taken either as a "formal minor" (requiring approval of the department of the minor) or as a "supporting program" approved by the Statistics Department. Students are encouraged to choose a minor field which will enhance their understanding of statistical theory and the applications in which they are individually most interested.

Thesis or Essay Requirement

All M.S. students are expected to write either a (short) thesis or an essay to demonstrate their capability for research, or their understanding of recent research papers in some area. This is normally done during the student's third semester, the topic and scope of the work being decided in consultation with his advisor.

Examinations

A written examination covering 18 hours of the student's statistical coursework is taken by all M.S. students early in their third semester. A "final oral" examination is given when a student's course work and thesis or essay are complete. This involves questioning on the major and minor course work and on the contents of the thesis or essay. The final oral exam is waived for a student who has passed a Ph.D. preliminary oral examination in statistics.

COURSES³ 4

- 11 BASIC CONCEPTS OF STATISTICS AND DATA ANALYSIS (3). No prerequisite. Basic concepts and techniques of data analysis emphasizing the role of statistics in making inferences, predictions, and decisions from data. *Fall and spring.* Staff.
- 12 BASIC CONCEPTS OF STATISTICS AND PROBABILITY (3). No prerequisite. An elementary introduction to probability and statistical inference. *Fall and spring.* Staff.
- 21 PROBABILITY FOR BUSINESS AND SOCIAL SCIENCES (Mathematics 21) (3). An introduction to probability for students in business administration and the social sciences. *Fall and spring.* Staff.
- 26 INTRODUCTION TO PROBABILITY FOR STATISTICS (3). An introduction to the theory and applications of probability. Topics covered include probability models, sample spaces, laws of probability, discrete and continuous random variables, probability distributions, expectation and variance, binomial and normal distributions, joint distributions, central limit theorem. *Fall and spring.* Staff.
- 27 INTRODUCTION TO STATISTICAL INFERENCE (3). Prerequisite Statistics 26. An introduction to the theory and applications of statistical inference. Topics covered include sampling distributions, estimation, hypothesis testing, regression, correlation, nonparametric statistics, contingency tables. *Fall and spring.* Staff.
- 101 ELEMENTS OF PROBABILITY AND STATISTICAL INFERENCE (3).
101X Prerequisite, integral calculus. Fundamentals of probability theory; descriptive statistics; fundamentals of statistical inference, including estimation and hypothesis testing. *Fall and spring.* Carroll, K.J.C. Smith.
- 102 ELEMENTS OF STATISTICAL ANALYSIS (3). Prerequisite, Statistics
102X 101. Various topics in statistical methods, including applied regression analysis, analysis of simple experimental designs, data analysis. *Fall and spring.* Carroll, Johnson, K.J.C. Smith.
- 107 LIFE CONTINGENCIES (Mathematics 107) (3). Prerequisite, Mathematics 32 or permission of instructor. Construction of mortality, sickness, multiple-decrement and other similar tables from graduated data; determination and use of the functions based thereon. Values of and premiums for annuities and assurances on one or more lives. Values of and contributions for sickness benefits, pension benefits, disability. Multiple decrement functions and their applications to pension funds and disability and accidental death benefits. *Fall.* Johnson.
- 111 METHODS OF MATHEMATICAL STATISTICS (3). Prerequisite, advanced calculus. Introductory treatment of special mathematical techniques of particular importance in probability and statistics, including complex variables, Fourier and Laplace transforms, elements of finite difference equations. *Spring.* Simons, W.L. Smith.

3. Names represent recent and anticipated instructors of these courses.

4. Years in which certain advanced courses are taught may differ from what appears on this list, depending on demand.

- 112 MEASURE AND INTEGRATION (3). Prerequisite, advanced calculus. Lebesgue and abstract measure and integration, convergence theorems, differentiation, Radon-Nikodym Theorem, product measures, Fubini Theorem, L_p -spaces. *Fall*. Leadbetter, Cambanis.
- 126 INTRODUCTION TO PROBABILITY (Mathematics 146) (3) Prerequisite, Mathematics 34. Introduction to mathematical theory of probability covering random variables, moments, binomial, Poisson, normal and related distributions, generating functions, sums and sequences of random variables, and statistical applications. *Fall and spring*. Cambanis, Baker, Kelly.
- 127 MATHEMATICAL STATISTICS (3). Prerequisite, Statistics 126 or equivalent. Functions of random samples and their probability distributions; introductory theory of point and interval estimation, and of hypothesis testing; elementary decision theory. *Spring*. Kelly, Carroll.
- 129 INTRODUCTION TO STOCHASTIC PROCESSES (3). Prerequisite, Statistics 126. Elementary theory and application of random process models, recurrent events, random walks. Markov chains. Poisson processes, birth-and-death processes, queueing processes, branching processes, Brownian motion, stationary processes. *Fall and spring*. Hoeffding, Kelly.
- 132 INTERMEDIATE PROBABILITY (3). Prerequisite, Statistics 112 or permission of instructor. Foundations of probability. Basic classical theorems. Modes of probabilistic convergence. Central limit problem. Generating functions, characteristic functions. Conditional probability and expectation. *Spring*. Cambanis, Leadbetter.
- 133 INTRODUCTION TO TIME SERIES ANALYSIS (3). Prerequisite, Statistics 126. Topics chosen from: Time series data analysis. Fitting parametric models, such as regression-autoregression models to time series. Spectrum analysis. Filtering. *Fall*. Wegman.
- 134 INTERMEDIATE STATISTICAL THEORY I (3). Prerequisite, two semesters of advanced calculus. Fundamentals of probability and distribution theory including: axiomatic treatment of probability, independence, random variables, characteristic functions, convergence and approximation, common distribution. *Fall*. Kelly, Simons, Wegman.
- 135 INTERMEDIATE STATISTICAL THEORY II (3). Prerequisite, Statistics 134 or equivalent. Fundamentals of statistical inference including: sufficient statistics, estimation, hypothesis testing, decision theory, various classical tests. Linear estimation, analysis of variance and regression are largely excluded (see Statistics 150). *Spring*. Simons, Wegman.
- 140 LINEAR SYSTEMS (3). Prerequisites, advanced calculus, elements of Fourier transform theory; linear algebra and Lebesgue integration helpful. Introduction to linear spaces, including basic results on normed linear spaces, Hilbert space geometry, bounded linear operators. Linear system theory, including signal representations, impulse response, transfer functions, dynamical systems, state variable methods, elementary modern control theory. *Fall*. Cambanis.
- 141 LINEAR OPERATORS AND OPTIMIZATION (3). Prerequisite, Statistics 140 or a knowledge of the basic theory of normed linear spaces and linear operators. Basic properties of compact operators. Dual spaces. Optimization in linear spaces, especially algorithmic methods. Optimization of functionals and constrained optimization. *Spring*. Baker.

- 142 INTRODUCTION TO ESTIMATION AND DETECTION THEORY (3). Prerequisites, Statistics 129, 134 and 140. The Wiener-Kolmogorov and the Kalman-Bucy filtering theories. Modulation theory. Basic problems of detection theory. *Spring*. Cambanis.
- 150 ANALYSIS OF VARIANCE WITH APPLICATION TO EXPERIMENTAL DESIGNS (3). Corequisite, Statistics 135. Linear estimation. Gauss-Markoff theorem. Sums of squares. Analysis of variance and simple factorial designs. Intrablock analysis of incomplete block designs. Balanced, lattice and Latin square designs. *Spring*. Carroll, Chakravarti.
- 156 COMBINATORIAL MATHEMATICS (Mathematics 148) (3). Prerequisites, Mathematics 134 or 138, Mathematics 121 or permission of the instructor. Topics chosen from: Generating functions, Pólya's theory of counting, partial orderings and incidence algebras, principle of inclusion-exclusion. Möbius inversion, combinatorial problems in physics and other branches of science. *Fall*. Brylawski, Kelly.
- 158 INTRODUCTION TO GRAPH THEORY (Mathematics 149) (3). Prerequisite, linear algebra. Basic concepts of directed and undirected graphs. Connectivity, traversability, and factorization of graphs. Planar graphs. Extremal problems. Automorphism group of a graph. Matrix representations. Coloring problems and the chromatic polynomial. *Spring*. Kelly.
- 160 APPLIED MULTIVARIATE ANALYSIS I (3). Prerequisite, Statistics 102. Exploratory and inferential multivariate techniques and applications. *Spring*. Staff.
- 170 ORDER STATISTICS (3). Prerequisite, Statistics 127. Distribution and moments of order statistics. Estimation of location and scale parameters, censoring. Robust estimation. Shortcut procedures. Treatment of outliers. Extreme-value theory. *Spring*. Carroll.
- 171 INTRODUCTION TO NONPARAMETRIC STATISTICS (Biostatistics 256) (3). Prerequisites, Statistics 102, and basic courses in statistical theory. Sign test, rank sum tests, rank correlation methods, order statistics, Kolomogorov-Smirnov goodness-of-fit tests, Fisher-Pitman randomization theory, k-sample tests, method of paired comparisons, power and asymptotic relative efficiency. *Fall*. Quade.
- 180 STOCHASTIC MODELS IN OPERATIONS RESEARCH (ORSA 180) (3). Prerequisite, Statistics 126. Introduction to queueing theory (substantial), Markovian sequential decision process, inventory theory and topics from stochastic linear programming, simulation, scheduling, game theory. Applications. *Spring*. Simons, W.L. Smith.
- 181 DETERMINISTIC MODELS IN OPERATIONS RESEARCH (Math 151. ORSA 181) (3). Prerequisite, Mathematics 147. Linear, integer, nonlinear and dynamic programming, classical optimization problems, network theory. *Fall*. W.L. Smith
- 200 APPLIED MULTIVARIATE ANALYSIS II (2). Prerequisite, Statistics 102 or 135. Relations between multiple regression, analysis of variance, multivariate analysis and factor analysis. Principal components. Discriminant analysis. Canonical analysis. Scaling methods. Classification problems. Cluster analysis. *Spring*. Johnson, K.J.C. Smith.
- 210 DESIGN AND ANALYSIS OF EXPERIMENTS (3). Prerequisites, Statistics 102 and 150. The principles of the design and analysis of

experiments. Randomized blocks. Latin and Graeco-Latin squares, factorial experiments. Confounding, fractional factorials, split plots, missing plots. Interblock analysis, Covariance analysis, Response surfaces. *Fall*. Johnson, Chakravarti.

- 220 THEORY OF ESTIMATION AND HYPOTHESIS TESTING (3). Prerequisites, Statistics 132, 135. Bayes procedures for estimation and testing. Minimax procedures. Unbiased estimators. Unbiased tests and similar tests. Invariant procedures. Sufficient statistics. Confidence sets. Large sample theory. *Fall*. Hoeffding.
- 221 SEQUENTIAL ANALYSIS (3). Prerequisites, Statistics 132 and 135. Hypothesis testing and estimation when the sample size depends on the observations. Sequential probability ratio tests. Sequential design of experiments. Optimal stopping. Stochastic approximation. (1977-1978 and alternate years.) *Fall*. Simons.
- 222 NONPARAMETRIC INFERENCE (3). Prerequisites, Statistics 132, 135 and 112. Estimation and testing when the functional form of the population distribution is unknown. Rank, sign and permutation tests. Optimum non-parametric tests and estimators, Robust procedures. *Spring*. Hoeffding.
- 223 STATISTICAL LARGE-SAMPLE THEORY (3). Prerequisites, Statistics 132 and 135. Asymptotically efficient estimators; maximum likelihood estimators; maximum probability estimators. Asymptotically optimal tests; likelihood ratio tests. (1976-1977 and alternate years.) *Spring*. Hoeffding.
- 231 ADVANCED PROBABILITY (3). Prerequisites, Statistics 132, 112. Advanced theoretic course, covering topics selected from: central limit theorems, laws of large numbers, stable laws, infinitely divisible laws, random walks, martingales. (1976-1977 and alternate years.) *Fall*. Simons, W.L. Smith.
- 232 GENERAL THEORY OF STATISTICAL DECISION (3). Prerequisites, Statistics 135 and 112. Selected topics in the general theory of statistical decisions, based on the work of Abraham Wald. (1976-1977 and alternate years.) *Spring*. Hoeffding.
- 235 STOCHASTIC PROCESSES (3). Prerequisites, Statistics 112 and 132. Advanced theoretic course including topics selected from: Foundations of stochastic processes, Renewal processes, Stationary processes, Markov processes, Martingales, Point processes. (1977-1978 and alternate years.) *Fall*. Leadbetter, W.L. Smith.
- 237 TIME SERIES ANALYSIS (3). Prerequisites, Statistics 112, 132. Analysis of time series data by means of particular models such as autoregressive and moving average schemes. Spectral theory for stationary processes and associated methods for inference. Stationarity testing. (1977-1978 and alternate years.) *Spring*. Leadbetter, Wegman.
- 242 ADVANCED DETECTION AND ESTIMATION THEORY (3). Prerequisite, Statistics 235 and 140. Singular detection problems, determination of the likelihood ratio for non-singular detection, nonparametric detection, non-linear filtering theory. *Spring*. Baer.
- 245 ADVANCED TOPICS IN STATISTICAL COMMUNICATION THEORY (3). Prerequisites, Statistics 142, 242 and 252. Topics of current research interest. *Fall*. Baker.

- 251 COMBINATORIAL PROBLEMS OF THE DESIGN OF EXPERIMENTS (3). Prerequisites, Statistics 150. Finite fields and finite geometries. Construction of orthogonal Latin squares and balanced incomplete block designs. Difference sets. *Fall*. Chakravarti.
- 252 INFORMATION THEORY (3). Prerequisite, Statistics 134. Transmission of information, entropy, message ensembles, discrete sources, transmission channels, channel encoding and decoding for discrete channels. *Spring*. Chakravarti.
- 253 ERROR CORRECTING CODES (3). Prerequisite, Statistics 251, or permission of the instructor. Linear codes and their error-correcting capabilities. Hamming codes. Reed-Muller codes. Cyclic codes. Bose-Chaudhuri codes. Burst error correction. Majority logic decoding. *Spring*. Chakravarti.
- 254 SPECIAL TOPICS IN DESIGN OF EXPERIMENTS I (3). Prerequisite, Statistics 150. Factorial experiments. Confounding, construction and analysis of symmetrical and fractional designs. Orthogonal arrays. Asymmetrical factorial designs. Response surface designs, second and third order rotatable designs. Mixture designs. Recent developments. *Fall*. Chakravarti.
- 255 SPECIAL TOPICS IN THE DESIGN OF EXPERIMENTS II (3). Prerequisite, Statistics 251. Combinatorial properties and construction of balanced, group divisible and partially balanced designs. Impossibility proofs. Orthogonal Latin squares of non-prime power orders. Orthogonal arrays. Asymmetrical fractionally replicated designs. Recent developments. *Spring*. Chakravarti.
- 260 MULTIVARIATE ANALYSIS (3). Prerequisites, Statistics 135 and matrices. Multivariate normal distributions. Related distributions. Tests and confidence intervals. Multivariate analysis of variance, covariance and regression. Association between subsets of a multivariate normal set. Theory of discriminant, canonical and factor analysis. *Fall*. Chakravarti, Johnson.
- 261 ADVANCED PARAMETRIC MULTIVARIATE ANALYSIS (3). Prerequisite, Statistics 260. Distribution problems involved in the normal theory analysis of general multivariate linear models including the growth curves. Roy's union intersection principle and its role in multivariate analysis. An introduction to Zonal polynomials and orthogonal groups. (1976-1977 and alternative years.) *Spring*. Sen.
- 262 INTRODUCTORY NONPARAMETRIC MULTIVARIATE ANALYSIS (3). The problem of symmetry in the multivariate case. Nonparametric MANOVA in one-way classifications. Robust rank order estimation in MANOVA. Large sample properties of the tests and estimates. Tests for independence. *Fall*. Sen.
- 263 ADVANCED NONPARAMETRIC MULTIVARIATE ANALYSIS (3). Prerequisite, Statistics 262. Nonparametric inference in multifactor multi-response experiments. Robust procedures in general linear models including the growth curves. Nonparametric classification problems. (1977-1978 and alternate years.) *Spring*. Sen.
- 280 ADVANCED STOCHASTIC METHODS OF OPERATION RESEARCH (3). Prerequisites, Statistics 132 and 180. Topics chosen from: renewal theory; queues with random arrivals; inequalities for queues; priority

systems; theory of reservoirs; stochastic inventory problems. *Spring*. W.L. Smith.

- 300 SEMINAR IN STATISTICAL LITERATURE (1 each). Prerequisite,
301 Statistics 135. *Fall and spring*. Staff.
- 302 SEMINAR IN STATISTICAL DATA ANALYSIS (Var). Prerequisite,
Statistics 102. *Spring*. Staff.
- 310 SEMINAR IN THEORETICAL STATISTICS (3 each). Prerequisite,
311 Statistics 135. *Fall and spring*. Staff.
- 321 SPECIAL PROBLEMS (3 each). Prerequisite, permission of the instructor.
322 *Fall and spring*. Staff.
- 331 ADVANCED RESEARCH (3 each). Prerequisite, permission of the
332 instructor. *Fall and spring*. Staff.
- 393 MASTER'S THESIS (3 or more). Prerequisite, permission of the student's
adviser. *Fall and spring*. Staff.
- 394 DOCTORAL DISSERTATION (3 or more). Prerequisite, permission of the
student's adviser. *Fall and spring*. Staff.
- 400 GENERAL REGISTRATION.

DEGREES AWARDED

	M.S.	Ph.D.		M.S.	Ph.D.
1948-68	24	90	1972-73	2	3
1968-69	5	8	1973-74	4	6
1969-70	2	4	1974-75	5	2
1970-71	3	5	1975-76	4	6
1971-72	4	5			

RECENT DISSERTATIONS:

The Theory of Unbiased Estimation for Some Non-Parametric Families of Probability Measures.

Non-linear Analysis of Spherically Invariant Processes and its Ramifications

Bounds and the Evaluation of Rate Distortion Functions.

Power Series Distributions, A Dual Class and Some Extensions.

Design and Analysis of Serial Experiments.

Automata in Environments.

Statistical Tests Based on the Levy and Prohorov Metrics.

Distribution Functions on Partially Ordered Spaces.

OPERATIONS RESEARCH AND SYSTEMS ANALYSIS CURRICULUM

The Department of Statistics is one of the core departments supporting the Operations Research and Systems Analysis (O.R.S.A.) Curriculum at the University. This Curriculum is a separate program offering the M.S. and Ph.D. degrees. In addition, degree candidates in statistics may elect a minor or supporting program in O.R.S.A.

The study of O.R.S.A. involves the application of diverse topics in mathematics and statistics to problems of resource allocation. At Chapel Hill, specialization is possible in theoretic areas (for example, Mathematical Programming, Stochastic Processes) or through specific applications (such as Urban and Environmental Systems, Population Studies, Biological Sciences).

For further information and/or applications for admission and financial aid, please write to:

Chairman

Operations Research and Systems Analysis Curriculum

Phillips Annex

University of North Carolina

Chapel Hill, North Carolina 27514

ADDITIONAL INFORMATION

Tuition and Fees

For full-time graduate students tuition and fees are payable at the current in-state rate of \$474.00 for the academic year. Recipients of certain appointments may be entitled to pay tuition at a lower rate at the discretion of the Board of Trustees. Tuition and fees for out-of-state students are presently \$2,118.00 per year.

Notice is given that upon proper authorization tuition and fees may be changed at any time.

Residence Status for Tuition Payment¹

General. Every applicant for admission is required to make a statement as to his or her length of residence in North Carolina. The tuition charge for legal residents of North Carolina is less than for nonresidents. To qualify for in-state tuition a legal resident must have maintained his domicile in North Carolina for at least 12 months immediately prior to his classification as a resident for tuition purposes. In order to be eligible for such classification, the student must establish that his or her presence in the State during such twelve-month period was for purposes of maintaining a bona fide domicile rather than for purposes of mere temporary residence incident to enrollment in an institution of higher education.

Domicile. Domicile means one's permanent dwelling place of indefinite duration, as distinguished from a temporary place of abode; synonymous with "legal residence".

Burden of Proof and Statutory Presumptions. The burden of establishing facts which justify classification of a student as a resident entitled to in-state tuition rates is on the applicant for such classification. For a student to be classified a resident for tuition purposes, the balancing of all the evidence must produce a clear preponderance of the evidence supporting the assertion of in-state residence. Proof of residential status is controlled, initially, by two statutorily prescribed and complementary presumptions, which are stated in terms of prima facie evidence:

a. If the parents or court-appointed legal guardian of the student (without reference to the question of whether the student is a minor or an adult) are not domiciliaries (legal residents) of North Carolina, under the Statute this fact constitutes prima facie evidence that the student is not a domiciliary (legal resident), of North Carolina, unless the student has lived in this State the five consecutive years prior to enrolling or re-registering. The student must assume the burden of rebutting the prima facie showing by producing evidence that he or she, independently, is in fact a domiciliary (legal resident) of North Carolina, in spite of the nonresident status of his or her parents;

¹The information in this section comes from three sources: (i) North Carolina General Statutes, Sec. 116-143.1; (ii) *A Manual to Assist the Public Higher Education Institutions of North Carolina in the Matter of Student Residence Classification for Tuition Purposes, July 1975*; (iii) Chancellor's Rules and Procedures for Residence Classification of Students for Tuition Purposes.

b. Conversely, if the parents of the student are domiciliaries of North Carolina under the Statute, this fact constitutes prima facie evidence that the student is a domiciliary of North Carolina. This prima facie evidence may also be rebutted by other evidence of legal residence. If the student has neither parents nor legal guardian, the prescribed prima facie evidence rule cannot and does not apply.

Statutory Exceptions

a. *Grace Period.* By virtue of the provisions of G.S. 116-143.1, if a student has been properly classified as a resident for tuition purposes, a change in that student's state of residence thereafter does not effect in all cases an immediate automatic loss of entitlement to the in-state tuition rate. To qualify for the grace period, the following conditions must be satisfied:

1. The student must have been properly classified as a resident for tuition purposes, on the basis of a valid finding that the student in fact was a legal resident of North Carolina and had been such for the requisite twelve-month period prior to classification;

2. At the time of subsequent change of legal residence to a state other than North Carolina, the student must have been enrolled in a public institution of higher education in North Carolina.

The extent of this grace period, during which the in-state rate is applicable in spite of the fact that the student is not a legal resident of North Carolina, is twelve months from the date of change in legal residence, plus any portion of a semester or academic term remaining, as of the expiration date of the twelve-month period, in which the student is enrolled.

b. *Qualifying Periods for Spouses.* By virtue of the provisions of G.S. 116-143.1, the prescribed twelve-month period of legal residence required for entitlement to classification as a resident for tuition purposes may be shortened on the basis of the marital status of the student, in specified circumstances. If a student otherwise can demonstrate compliance with the fundamental statutory requirement that he or she be a legal resident of North Carolina, the second statutory requirement relating to duration of residence may be satisfied derivatively, in less than twelve months, by reference to the length of the legal residence of the spouse of the student, if the spouse has been a legal resident of the State for the requisite twelve-month period.

Married Persons. The domicile of a married person, irrespective of sex, is determined by reference to all relevant evidence of domiciliary intent. No person shall be precluded, solely by reason of marriage to a person domiciled outside of North Carolina, from establishing or maintaining legal residence in North Carolina. No person shall be deemed, solely by reason of marriage to a person domiciled in North Carolina, to have established or maintained a legal residence in North Carolina. The fact of marriage and the place of domicile of his or her spouse shall be deemed relevant evidence to be considered in ascertaining domiciliary intent.

Minors. A minor is any person who has not reached the age of eighteen years. The domicile of a minor is that of the father. With a few exceptions

noted below, this presumption is virtually irrebuttable. If the father is deceased, the domicile of the minor is that of the surviving mother. If the parents are divorced or legally separated, the domicile of the minor is that of the parent having custody by virtue of a court order; or, if no custody has been granted by virtue of court order, the domicile of the minor is that of the parent with whom he lives; or, if the minor lives with neither parent, in the absence of a custody award, the domicile of the minor is presumed to remain that of the father. Even though a person is a minor, under certain circumstances the person may be treated by the law as being sufficiently independent from his parents as to enjoy a species of adulthood for legal purposes. The consequence, for present purposes, of such circumstances is that the affected person is presumed to be capable of establishing a domicile independent of that of the parents; it remains for that person to demonstrate that a separate domicile in fact has been established. The circumstances recognized as having the potentially emancipating effect are:

a. Marriage of the minor person;

b. Parental disclaimer of entitlement to the minor's earnings and the minor's proclamation and actual experience of financial independence from his parents, with the actual establishment and maintenance of a separate and independent place of residence.

Aliens. An alien holding a visa which will permit eventual permanent residence in the United States is subject to the same considerations as a citizen. An alien holding a visa which will not permit eventual permanent residence in the United States (for example, a student visa) cannot be classified as a resident.

Military Personnel. The domicile of a person employed by the Federal Government is not necessarily affected by assignment in or reassignment out of North Carolina. Such a person may establish domicile for himself by the usual requirements of residential act plus intent. No person shall lose his in-state residence status solely by serving in the armed forces outside of the State of North Carolina.

Property and Taxes. Ownership of property in or payment of taxes to the State of North Carolina apart from legal residence will not qualify one for the in-state tuition rate.

Change of Status. A student admitted to initial enrollment in an institution (or permitted to re-enroll following an absence from the institutional program which involved a formal withdrawal from enrollment) shall be classified by the admitting institution either as a resident or as a nonresident for tuition purposes prior to actual matriculation. A residential classification once assigned (and confirmed pursuant to any appellate process invoked) may be changed thereafter (with corresponding change in billing rates) only at intervals corresponding with the established primary divisions of the academic calendar.

Transfer Students. When a student transfers from one North Carolina public institution of higher education to another, he or she is treated as a new student by the institution to which he or she is transferring and must be assigned an initial Residential Classification for tuition purposes

The transfer into or admission to a different component of the same institution (e.g., from an undergraduate to a graduate or professional program) is not construed as a transfer from one institution to another and, thus, does not by itself require a reclassification inquiry unless (1) the affected student requests a reclassification inquiry or (2) the transfer or enrollment occurs following the lapse of more than one quarter, semester, or term during which the individual was not enrolled as a student.

Responsibility of Students. Any student or prospective student in doubt concerning his residence status must bear the responsibility for securing a ruling by stating his or her case in writing to the admissions officer. The student who, due to subsequent events, becomes eligible for a change in classification, whether from out-of-state to in-state or the reverse, has the responsibility of immediately informing the Office of Admission of these circumstances in writing. Failure to give complete and correct information regarding residence constitutes grounds for disciplinary action.

It is the responsibility of the student to pay tuition at the rate charged and billed while an appeal is pending. In effect, the student who is classified as a nonresident at the time of tuition billing should pay the nonresident rate. Conversely, if a student is classified as a resident at the time of billing, he or she should pay the resident rate.

Appeals of Rulings of Admission Officers. A student appeal of a classification decision made by any admissions officer shall be filed by the student with that officer in writing and shall be transmitted to the Residence Status Committee by that officer, who shall not vote in that Committee on the disposition of such appeal. The student shall be notified of the date set for consideration of the appeal and, on request of the student, he or she shall be afforded an opportunity to appear and be heard by the Committee. Any student desiring to appeal a decision of the Residence Status Committee shall give notice in writing of that fact within 10 days of receipt by the student of the decision of the Residence Status Committee, and the basis for such appeal, to the Chairman of the Residence Status Committee, and the Chairman shall promptly transmit the appeal to the State Residence Committee.

A complete explanation of the statute and the procedures under the statute is contained in *A Manual to Assist the Public Higher Education Institutions of North Carolina in the Matter of Student Residence Classification for Tuition Purposes*. This manual and other information concerning the application of this law is available for inspection in the Admissions Offices of the University.

All students are responsible for knowledge of the contents of the statute and the *Manual*.

DIRECTORY INFORMATION

The University of North Carolina at Chapel Hill has routinely made public certain information about its students. Some typical ways this has been done include the following: names of students who are selected by the various honorary societies, who receive scholarships, who make the Dean's List, who hold offices, or who are members of athletic teams are frequently

made public. To facilitate campus communication the University annually publishes the *Campus Directory*. Some professional and graduate school student groups publish directories of students in their departments or schools. The annual commencement program publishes the names of persons who have received degrees during the year.

The Family Educational Rights and Privacy Act defines the term "directory information" to include the following categories of information: the student's name, address, telephone listing, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, and the most recent previous educational agency or institution attended by the student. The University will make public information about each student **limited** to these categories in ways such as those described above. Of course, information from all these categories is not made public in every listing. The *Campus Directory*, for example, publishes only names, addresses and telephone numbers.

Students who do not wish to have any or all of such "directory information" made public without their prior consent must notify the Office of Records and Registration, The University of North Carolina at Chapel Hill, of this fact in a signed and dated statement specifying items that are not to be published. This notice must be received by the Office of Records and Registration by the end of the registration period for the semester or session of first enrollment, or, after an absence, of re-enrollment, and by the end of each fall registration period thereafter.

Nondiscrimination Policy

The University of North Carolina at Chapel Hill is committed to the principle of equal opportunity. It is the policy of this University not to discriminate on the basis of race, sex, color, national origin, religion, or handicap with regard to its students, employees, or applicants for admission or employment. Such discrimination is also prohibited by federal law. Any complaints alleging failure of this institution to follow this policy should be brought to the attention of the Assistant to the Chancellor.

Housing

The primary objective of the Department of University Housing at Chapel Hill is to provide a physical and psychological atmosphere conducive to each and every student having opportunity to develop to the utmost his or her personality, ability and sensitivity. The University provides residence hall accommodations for approximately 6600 registered students—undergraduate, graduate, and professional men and women. Three hundred and six apartments are available for married students.

Information regarding residence hall accommodations is available by writing to: Department of University Housing, Contracts Office, Carr Building, The University of North Carolina at Chapel Hill, North Carolina 27514.

Information regarding married student housing is available by writing to: Manager, UNC Married Student Housing, Odum Village, Branson Street, Chapel Hill, North Carolina 27514.

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