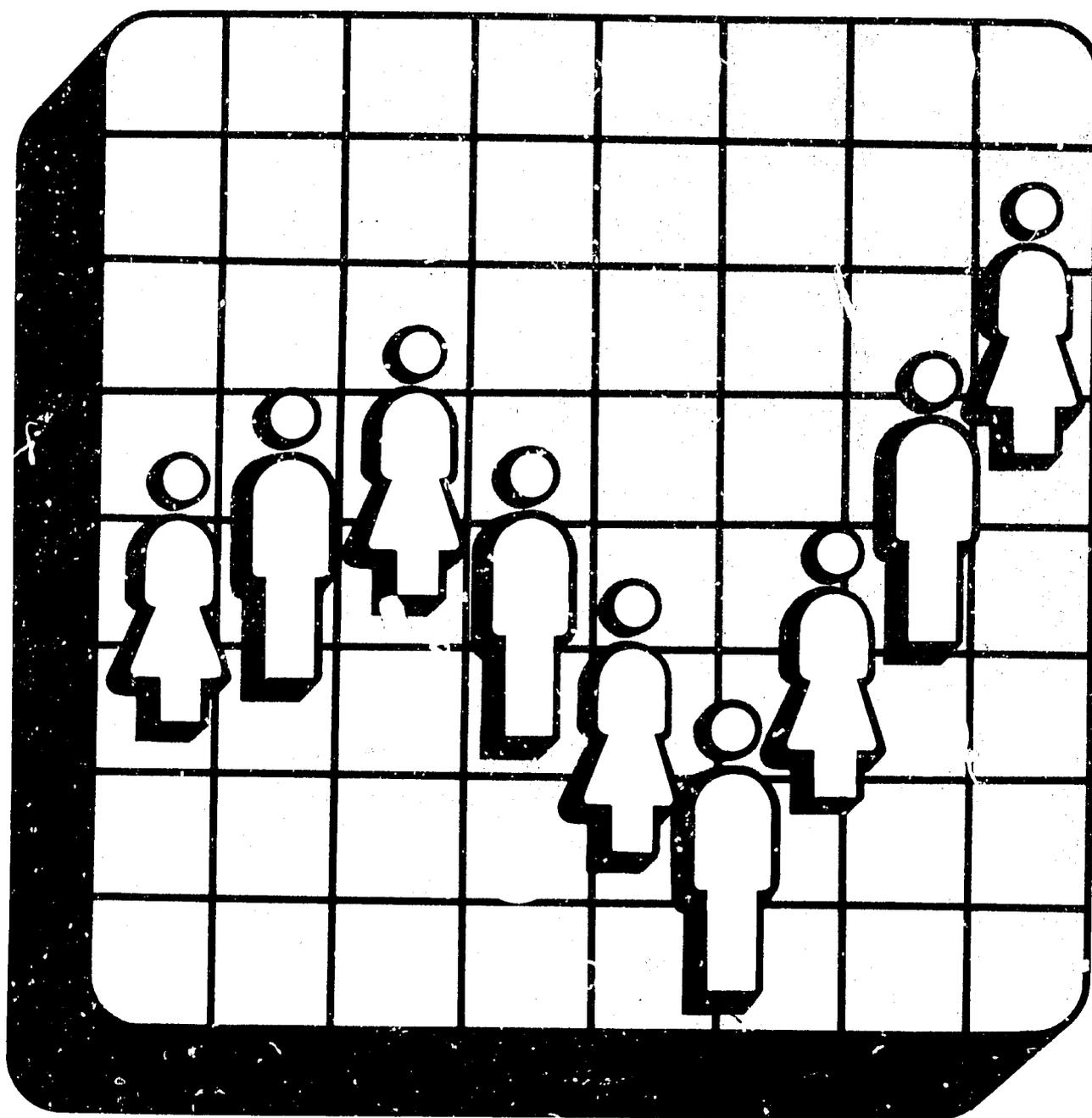


# International Statistical Training Programs

U.S. Department of Commerce  
BUREAU OF THE CENSUS

August 1982 to August 1983



# Calendar of Training Activities

<u>Date</u>	<u>Activity</u>
August 26 to 29, 1982.....	Arrival of participants and orientation at Agency for International Development (Washington) or United Nations (New York)
August 30 to September 1.....	Orientation at Washington International Center
September 2 and 3.....	Orientation at the Bureau of the Census
September 7 to October 13.....	FIRST TRAINING PERIOD (6 weeks)
October 18 to December 17.....	SECOND TRAINING PERIOD (9 weeks)
December 18 to January 2, 1983.....	Mid-Winter Community Seminar and recess
January 3 to March 25.....	THIRD TRAINING PERIOD (12 weeks)
March 21 to April 1.....	Workshop, "Training for Statistical Activities," and recess
April 4 to June 17.....	FOURTH TRAINING PERIOD (11 weeks)
May 16 to 20.....	Management-Communication Seminar
June 20 to July 29.....	FIFTH TRAINING PERIOD (6 weeks)
	Full-time workshops and field demonstrations in current agricultural surveys and socio-economic surveys
August 1 to 3.....	Consultation, evaluation, exit interviews, and departure of participants

Location of ISPC:

Scuderi Building  
 Suite 213, Second floor  
 4235 28th Avenue  
 Marlow Heights, Maryland  
 Telephone: (301) 763-2860

Mailing address:

Training Branch  
 International Statistical  
 Programs Center  
 Bureau of the Census  
 Washington, D.C. 20233

# International Statistical Training Programs

**August 1982 to August 1983**

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Sampling and Statistical Methods

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Agricultural Statistics

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Demographic Statistics

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Economic Statistics

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Computer Data Systems

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Survey Methods

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Conducted by the U.S. Bureau of the Census  
under a Resources Support Services Agreement  
with the Agency for International Development,  
U.S. International Development Cooperation Agency



U.S. Department of Commerce  
BUREAU OF THE CENSUS  
International Statistical Programs Center  
Washington, D.C.

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## New Features in 1982/1983

New titles for several curriculum areas. Six training curricula are offered by ISPC in 1982/1983. Three of these are functional specializations--Sampling and Statistical Methods, Computer Data Systems, and Survey Methods. Three are subject-matter fields for which data collection and analysis methods are taught--Agricultural Statistics, Demographic Statistics, and Economic Statistics. The curriculum in Agricultural Statistics reflects a merging of course offerings in Agricultural Surveys and Censuses and Agricultural Economics. Other curricula are similar to 1981/1982 ISPC offerings, with different names. The content of several of these curricula has been revised and updated, as indicated below.

Economic Statistics courses on measurement of living standards and social accounts. In addition to economic survey-census methodology, the Economic Statistics curriculum will feature courses on methods for measuring the living standards of households and the use of social accounts to assess the impacts of development. These courses support objectives of the Living Standards Measurement Study of World Bank and of national programs to measure the distribution of the benefits of development.

Demographic Statistics workshop on tabular analysis of census data. The 1980 round of population censuses has almost been completed. If the basic social and economic data from these censuses are to have a value justifying the cost of their collection, statistical offices must be able to provide data users with tabular analyses of these characteristics with simple interpretive text. A workshop is offered this year by ISPC as part of the Demographic Statistics curriculum to assist participants in developing this capability.

Computer Data Systems course on microcomputers and BASIC programming. Small-scale, "personal" computers provide an appropriate option to statisticians who cannot get adequate access to a large main-frame computer. This problem is especially prevalent in developing countries where computing resources are quite limited. This year, for the first time, ISPC will offer a course introducing Computer Data Systems participants to microprocessor hardware and teaching them the elements of the BASIC programming language used on many different small computers.

Special program on Census-Survey Geography. A 1-year Diploma specialization in Census-Survey Geography will be offered in 1982/1983. Participants in this specialization will be trained in manual and automated cartographic techniques and in the application of these techniques to survey and census mapping. Much of the training offered will be intensive laboratory instruction and practice and on-the-job training projects. For this reason, enrollment is restricted. Additional participants can be accepted for the first 4 months of the program (September through December 1982) when manual cartographic techniques are emphasized. All ISPC participants will be eligible to enroll in an expanded course on Geography and Mapping for Surveys and Censuses.

Continued opportunity for training in vital statistics methods. The course, Civil Registration and Vital Statistics Methods, offered first in 1980/1981, will be continued in 1982/1983. In addition to this course, opportunities will be provided for attendance at short courses and for consultation visits to vital statistics offices and health statistics centers in the United States.

Continued emphasis on the development of national household survey capabilities. In June and July 1982 and again in June and July 1983, ISPC will offer a workshop on Planning and Implementing a Household Survey Program. This 9-week workshop and field demonstration is in support of the objectives of the United Nations National Household Survey Capability Program.

# International Statistical Training Programs

## I. Introduction

The International Statistical Programs Center (ISPC) of the U.S. Bureau of the Census has conducted training programs for foreign statisticians for more than 30 years and through these programs has contributed substantially to statistical development in many countries. The programs are conducted under the auspices of the Agency for International Development (AID); they serve urgent and changing needs of developing countries for trained personnel to collect, process, and analyze statistical data. The training is conducted in English.

The programs described in this booklet are offered during the period August 1982 to August 1983. Some are full-year programs, while others are for short terms. In content, they differ from the programs offered in past years in that the curriculum has been updated and expanded to include new and advanced topics and techniques to meet the current needs of countries. A training program is offered in each of the following specializations:

- (1) Sampling and Statistical Methods
- (2) Agricultural Statistics
- (3) Demographic Statistics
- (4) Economic Statistics
- (5) Computer Data Systems
- (6) Survey Methods

The six programs listed above are directed toward training statisticians in the specific skills needed to carry out many different phases of ongoing statistical activities. Although participants specialize in one area, they are introduced to clearly

related and auxiliary fields and skills to give them an understanding of how their specialty fits into the total statistical system.

The culmination of the ISPC program is a demonstration survey which is planned, prepared, and conducted by the participants under supervision of the training staff. Participants in the Sampling and Statistical Methods, Agricultural Statistics, Demographic Statistics, Economic Statistics, Computer Data Systems, and Survey Methods training programs participate in either an agricultural or a socioeconomic field demonstration survey. Technical and organizational skills learned in the classroom and applied in the practical field exercises prepare participants to play a major role in designing, conducting, processing, and analyzing the type of nation-wide census or survey called for by the World Census of Agriculture or the National Household Survey Capability Program. A demonstration enterprise survey also is scheduled for participants in the Economic Statistics program. (More specific descriptions of the curricula of the regular 1-year programs are found on pages 10 to 21.)

## II. Objectives and Curriculum

The program is designed to provide practical training both for men and women who have responsibility for data collection operations and for those engaged in research and analysis. The principal objectives of the program are (a) to train statisticians and technicians in the variety of skills needed to plan and carry out surveys, censuses, and numerous other statistical activities, and (b) to train these persons

to assist others in developing similar skills, thus introducing an important multiplier effect at the national level. ISPC has developed a variety of materials, not only in survey and census methods but also in the production of other basic economic and social statistics and in electronic data processing. The program provides for specific training in each of the six areas listed above, although some courses have broad interest and applicability and overlap several specialities.

The program has several secondary objectives. It offers participants the opportunity (a) to meet and talk with professional statisticians in both government and private agencies in the United States and to observe their work, (b) to become acquainted with new technology which is, or soon will be, available in their countries, and (c) to exchange experiences with technicians from a number of other countries with similar resources.

The training is conducted through classroom and laboratory sessions, seminars, workshops, field exercises, and group projects. It is oriented toward surveys and censuses and related statistical operations and emphasizes the practical aspects; however, theory and principles also are presented to provide the basis for practical applications. Credit for successful completion of a course is awarded by the Graduate School of the U.S. Department of Agriculture<sup>1</sup>, with which the Bureau of the Census has a cooperative agreement.

Participants who enroll in undergraduate academic programs at the George Washington University after the completion of their 1-year ISPC training programs can be awarded the equivalent of one year of advanced standing credits toward the baccalaureate degree requirements of

the departments of Statistics, Economics, Sociology, Geography, or Electrical Engineering. Participants in the Combined Degree Program, conducted jointly by ISPC and the George Washington University, earn advanced standing credits toward a Master of Science degree by completing the 1-year ISPC training program; this program is described in Annex I, page 37, in the back of this booklet. Participants in the Demography Degree Program, conducted jointly by ISPC and Georgetown University, earn advanced standing credits toward a Master of Arts degree by completing the 1-year ISPC program in Demographic Statistics. See Annex II, page 41, in the back of this booklet for details. Awarding of advanced standing credit toward either undergraduate or graduate degrees for participants who complete the ISPC training program and who wish to follow an academic program at another university also can be arranged on a case-by-case basis.

A complete list of ISPC courses and selected courses available at other institutions is given on pages 7 to 9. Courses are selected and programs are arranged to satisfy the individual participant's needs and objectives. Suggested programs for each training period for each of the six specialized areas are given on pages 10 to 21. Participants whose training objectives are not defined within these areas may select courses from the ISPC curricula and courses offered by other institutions according to their individual needs

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<sup>1</sup>Although originally established for continued training of agricultural employees in the Government, the Graduate School has expanded its curriculum and offers courses at both the graduate and the undergraduate level in various disciplines--economics, mathematics, statistics, computer science, language, etc. The purpose of the Graduate School is to provide lifetime learning opportunities for Government workers.

with approval of their Training Advisers. (See page 9 for an illustrative list of some of the courses that are available.) Course descriptions, in order by course number, start on page 24.

### III. Special Programs

Special-purpose programs--It is possible for ISPC to arrange programs of varying lengths on statistical topics appropriate to the specific training needs of groups of participants constituted by a sponsor. Special-purpose group training can be arranged on topics such as census/survey geography or printing and reproduction. These group training programs consist of courses at ISPC or other institutions, consultation and visitation programs, attendance at selected conferences, and practical work experience.

Short visitation and consultation programs from a few days to a few weeks in length can be arranged by ISPC within the Census Bureau and other agencies to meet the specific objectives of individual participants or groups. Procedures for applying for either individual or group special-purpose programs are explained on page 23.

#### Planning and implementing a household survey--

In June and July 1983, a workshop will be held at ISPC in Washington for statisticians and subject-matter specialists who are or who will be involved in the development of a continuing multi-subject household survey program. More detailed information about this workshop is given on page 23.

### IV. Calendar of Activities

A Calendar of Training Activities appears on the inside cover of this booklet. It lists

the major elements of the program and their scheduled dates. One week of general orientation to the United States at the Washington International Center and at the Bureau of the Census precedes the technical training. Similar arrangements can be made for persons arriving at later dates for parts of the full program. Participants should be scheduled to arrive in the U.S. approximately 10 days before their training programs begin to allow time for this orientation and to complete their housing arrangements.

The year's program is divided into five training periods. The first four consist primarily of classroom and laboratory work, group discussion, and seminars; participants receive basic training in the professional knowledge and skills needed to carry out statistical operations and analyses. They are then prepared to participate fully in the case-study workshops and field demonstrations that constitute the training in the fifth period. All persons who receive the classroom training normally participate in the workshops offered in their specialized fields in order to gain full benefit from "on-the-job" training. Separate enrollment in the workshops and field work may be arranged for participants with appropriate previous experience and training.

The first training period, which is relatively short, provides for intensive basic training in a limited number of subjects. The second, third, and fourth periods are about equal in length and scope, providing a progressive, integrated program in the participant's field of specialization.

A 1-week Management-Communication Seminar is a basic element of all training programs for ISPC participants. The seminar is conducted in May by Management-Communication Associates outside the Washington area.

Also, during the last week of December, mid-winter community seminars are planned for several locations away from Washington, D.C. These seminars are conducted by voluntary organizations working in cooperation with AID. The programs are designed primarily to convey various aspects of community life in the United States.

## V. Program Duration

Full-year program--The full ISPC training program, including preprogram orientation and predeparture activities, requires 1 year. It is strongly recommended that participants be scheduled for the full-year program, and that they arrive about 10 days before it begins; however, as noted below, arrangements can be made for short-term programs of one to four training periods in length.

Short-term programs--Participation in short-term programs consisting of one or more training periods selected from the full-year program can be arranged. Programs starting at the beginning of the first training period may be arranged for  $10\frac{1}{2}$  months,  $7\frac{1}{2}$  months, or 4 months. Persons wishing to enroll for short-term programs beginning after the first training period should have previous education or experience equivalent to the courses they would miss by late enrollment.

Supplement to academic programs--At the request of the sponsoring agency, ISPC may arrange a training program one or more training periods in length for participants from developing countries who are placed in American universities to study statistics or related fields. The program would emphasize practical statistical applications that utilize or supplement the academic training. It is especially valuable

to arrange for enrollment in the Workshop on Planning and Implementing a Household Survey Program in June and July for students who are on academic vacation or who have finished their academic programs.

## VI. Diplomas and Certificates

A diploma is awarded by ISPC upon satisfactory completion of the full 1-year ISPC curriculum in any of the six regular specializations. The recommended courses in each specialization are listed on pages 11, 13, 15, 17, 19, and 21. To complete the curriculum in any area of specialization, a participant must satisfactorily complete a minimum number of recommended and elective courses chosen by the participant with the advice of his or her Training Adviser. All diploma candidates must successfully complete at least one statistical methods and one sampling course as well as a course on control and evaluation of nonsampling error. Completion of five survey methods courses also is required. These include courses on training and management applied to statistical activities and a special programs course which introduces new developments in statistical technology. In addition, all participants are strongly encouraged to take the course on design of tables and questionnaires. Completion of the curriculum also necessitates the participant's arriving in the United States early enough to begin the first training period on time. Sponsors of participants who lack mathematical skills which are prerequisite for required statistical methods and sampling courses are advised to arrange for their arrival 1 month in advance to remedy this deficiency.

A certificate is awarded by ISPC upon successful completion of a short-term program--less than the full year but at least 3 months.

The USDA Graduate School provides a transcript of credits for each course satisfactorily completed, regardless of the length of the participant's program.

## VII. Program Costs and Sponsorship

The costs of participating in an ISPC training program include international travel, subsistence, and course fees. Course fees include an ISPC program fee, fees for training services provided by agencies other than ISPC, transportation for program-related travel within the U.S., and books and other training materials. Course fees for a 1-year program total approximately \$12,500; course fees for shorter programs are provided in response to requests which specify the duration and content of the program to be arranged.

Course fees are paid to ISPC by the participant's sponsoring agency. Possible sponsors include Missions of the U.S. Agency for International Development; United Nations Development Program, Food and Agriculture Organization, World Bank, or another of the UN specialized agencies; the Organization of American States; Asia Foundation or other private foundations; or an agency of the participant's own Government. The U.S. Bureau of the Census has no fellowship funds, nor can we make recommendations to a sponsoring agency on behalf of a prospective participant.

The sponsoring agency also pays a subsistence allowance to the participant, either directly or through the administrative office of ISPC. A supplemental stipend usually is provided to cover exceptional costs during the first month of the training program and while

the participant is engaged in program-related travel. The amounts of the regular and supplemental subsistence allowances vary by sponsor.

All cost figures given in this section are subject to change. All participants are required to have health insurance. If the sponsoring agency does not provide it, the participant will be responsible for obtaining his or her own health insurance policy. The ISPC staff will assist in making insurance arrangements.

## VIII. Qualifications of Participants

The ISPC training programs are conducted primarily for statisticians and technicians who have had some working experience (at least a year) in national statistical programs. Formal educational background may range from high school graduation to advanced university degrees. Academic training in mathematics, statistics, and economics is desirable; at least a basic knowledge of algebra is required.

A minimum English language score of 70/70 (ALIGU) is required, although a higher level is needed to obtain major benefits from the program. AID missions and other sponsoring agencies are urged to provide potential participants with the necessary training to attain maximum proficiency in English prior to their arrival in the United States. In cases where failure to meet the English language requirements would mean a serious delay in providing training, arrangements may be made for participants to receive intensive English language training in the United States for 1 to 3 months prior to their enrolling in the ISPC program. As a rough guide, a score of 50 to 60 would require 2 months, and 40 to 50 would require

3 months. Sponsors wishing to send participants to the United States to receive training in English should provide for the extra time and funds.

The qualification conditions apply, in general, to the regular ISPC training program. Specific candidate requirements for each area of specialization are given on pages 10, 12, 14, 16, 18, and 20. Additional candidate requirements for the Master's degree programs are given in the annexes at the back of this booklet. In addition to ISPC qualification conditions, all candidates for enrollment in the training program must fulfill the requirements of their sponsoring agencies.

### IX. Action to be Taken by Sponsoring Agency

If a participant is to be sponsored by the Agency for International Development, PIO/P's and biographical data should be sent from the USAID Mission to AID/Washington for transmittal to ISPC. If the nominee is to be sponsored by United Nations, a nomination form should be sent by the local UN Representative to UN Headquarters in New York. Nominations for FAO-sponsored participants should be sent from the local FAO representative to FAO/Rome. For other sponsors, nominations should be initiated from the representative of the sponsoring agency in the participant's country and forwarded through appropriate channels to the Bureau of the Census. Own Government sponsors should write directly to ISPC for nomination instructions.

It is desirable that nominations of qualified participants be made sufficiently early to allow for completion of visa and other administrative arrangements and for arranging their programs. If possible, nominations should be submitted at least 2 months before the training program is to begin. If late nominations are received, ISPC will try to expedite their processing; however, participants may miss important orientation or early training sessions in such cases.

### X. Other Considerations

*Participants are requested to bring with them questionnaires, instructions, descriptions of procedures, publications, and other materials pertinent to the national statistical program in which they may be engaged. These materials will be of practical value to the participants throughout their training. Also, for the purpose of relating training objectives to the candidate's future job responsibilities, it is strongly recommended that the objectives and content of the proposed training program be discussed in detail by the candidate, the candidate's sponsor, and a representative of the sponsoring agency prior to departure from the home country.*

### XI. Additional Information

For further information about the program, refer to the AID Mission or to the UN or FAO resident representative in the country or region, or write directly to the--

Chief  
Training Branch  
International Statistical  
Programs Center  
U.S. Bureau of the Census  
Washington, D.C. 20233  
U.S.A.

## Curriculum of Courses by Subject Area

<u>Course number</u>	<b>Sampling and Statistical Methods</b>	<u>Training period</u>
101	Introduction to Statistical Methods.....	1 and 2
102	Introduction to Survey Sampling.....	2
103	Applied Regression and Correlation Analysis.....	3
104	Design of Sample Surveys.....	1 and 2
105	Survey Sampling Laboratory.....	1 and 2
106	Variance Estimation in Sample Surveys.....	3
107	Laboratory in Variance Estimation Techniques.....	3
108	Control and Evaluation of Nonsampling Error.....	4
109	Quality Control in Censuses and Surveys.....	4
110	Applications of Current Survey Design and Evaluation Techniques.....	4
111	Introduction to the Analysis of Data.....	3
120	Field Demonstration Laboratory in Sampling and Statistical Methods.....	3 and 4
150	Seminar: Selected Topics in Sampling and Statistical Methods.....	3 and 4
190	Case Study in Sampling: Workshop and Field Demonstration.....	5
<b>Agricultural Statistics *</b>		
201	Concepts and Tools for Agricultural Statistics.....	1
202	Economics of Agricultural Development.....	2
203	Agricultural Survey Operations and Methods.....	2 and 3
204	Agricultural Sample Survey Design.....	3
205	Frame Construction for Agricultural Samples.....	3
206	Objective Measurement of Area and Yield.....	4
207	Agricultural Estimating Techniques.....	4
208	Use of Agricultural Statistics in Economic Development Planning.....	3
220	Field Demonstration Laboratory in Agricultural Statistics.....	3 and 4
250	Seminar: Selected Topics in Agricultural Statistics.....	3 and 4
290	Case Study in Agricultural Statistics: Workshop and Field Demonstration...	5
<b>Demographic Statistics</b>		
301	Population Dynamics and Introduction to Demographic Analysis.....	1
303	Civil Registration and Vital Statistics Methods.....	2
304	Techniques of Demographic Analysis: Mortality and Fertility.....	2
305	Demographic Analysis Laboratory.....	2
306	Demographic Measures from Incomplete Data.....	3
307	Advanced Demographic Analysis Laboratory.....	3
308	Alternative Strategies for the Collection and Analysis of Demographic Data.	4
309	Workshop: Tabular Analysis of Census Data.....	4
310	Collection and Analysis of Migration Data.....	3
311	Population Projections: Concepts and Applications.....	4
320	Population Field Demonstration Laboratory.....	3 and 4
350	Seminar: Selected Topics in Population and Demography.....	4
390	Case Study in Demographic Statistics: Household Survey Workshop and Field Demonstration.....	5

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\*Joint training program of the U.S. Bureau of the Census and the Food and Agriculture Organization of the United Nations in collaboration with the Statistical Reporting Service, U.S. Department of Agriculture.

<u>Course number</u>	<b>Economic Statistics</b>	<u>Training period</u>
401	Microeconomic Concepts for Statisticians.....	1
402	Macroeconomic Concepts for Statisticians.....	2
403	Elements of Economic Survey-Census Operations.....	1
405	Applications of Economic Survey-Census Techniques.....	2
406	Social Accounting.....	2
407	Foreign Trade Statistical Operations.....	3
409	Measurement of Living Standards.....	3
410	Economic Development.....	4
420	Socioeconomic Field Demonstration Laboratory.....	3 and 4
430	Economic Enterprise Survey: Field Demonstration Laboratory.....	3
450	Seminar: Selected Topics in Economic Statistics.....	4
490	Case Study in Economic Statistics: Household Survey Workshop and Field Demonstration.....	5

### Computer Data Systems

501	Computer Processing Fundamentals.....	1
502	Fundamentals of Programming.....	1
503	Computer Programming in Structured COBOL.....	2
504	Concepts of IBM Systems 360/370.....	2
505	Systems Analysis and Management.....	3
506	Disk Operating System (DOS) Concepts and Job Control Language (DOS JCL)....	3
507	Operating System (OS) Concepts and Job Control Language (OS JCL).....	3
509	Advanced Structured COBOL.....	2 or 3
510	Data Base Design and Management.....	4
511	COCENTS-COBOL Census Tabulation System.....	4
512	CONCOR-Editing and Imputation System.....	3
514	FORTRAN IV Coding and Testing.....	4
515	Microcomputers and BASIC Programming.....	4
520	Field Demonstration Laboratory in Systems Analysts.....	3 and 4
550	Seminar: Selected Topics in Computer Data Systems.....	3 and 4
590	Case Study in Computer Data Systems: Workshop and Field Demonstration.....	5

### Survey Methods

600	Introduction to Design of Surveys and Censuses.....	1
601	Introduction to Data Processing for Subject-Matter Specialists.....	2
602	Design of Tables and Questionnaires.....	2
603	Geography and Mapping for Surveys and Censuses.....	3 and 4
604	Budgeting, Scheduling and Controlling of Survey-Census Operations.....	2
605	Editing, Coding, and Imputation Principles.....	3
606	Management of Statistical Activities.....	4
608	Presentation, Publication, and Dissemination of Data.....	4
609	Workshop: Training for Statistical Activities.....	3
620	Field Demonstration Laboratory in Survey Methods.....	3 and 4
650	Seminar: Selected Topics in Survey Methods.....	3 and 4
690	Case Study in Survey Methods: Workshop and Field Demonstration.....	5
695	Special Programs in Statistical Technology.....	3

### **ISPC-George Washington University Combined Degree Program in Social and Economic Statistics**

A qualified participant may enroll in the Combined Degree Program to earn a Master of Science in Special Studies degree with a concentration in Social and Economic Statistics from the George Washington University. This program requires the satisfactory completion of the full 1-year ISPC curriculum (beginning September 7, 1982) and a 4-month extension for additional university courses. The participant must have an undergraduate degree and must meet the English language requirements of George Washington University. For details of the program, see Annex I, page 37, in this booklet.

### **ISPC-Georgetown University Demography Degree Program**

A qualified Demographic Statistics participant may enroll in the Demography Degree Program to earn a Master of Arts in Demography degree from Georgetown University. This program requires the satisfactory completion of the full 1-year ISPC curriculum in Demographic Statistics (beginning September 7, 1982) and a 6-month extension to complete additional university courses and other degree requirements. The participant must have an undergraduate degree and must meet the English language requirements of Georgetown University. For details of the program, see Annex II, page 41, in this booklet.

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## **Illustrative Lists of Courses that ISPC Can Arrange at Other Institutions**

### At the Applied Statistics Training Institute

Vital Statistics Measurement and Utilization  
Vital Statistics Records and Their  
Administration

Family Planning Statistics  
Tabular and Graphic Presentation of Data  
Nature and Use of Mortality Data System

### At the George Washington University

Elements of Remote Sensing  
Photo-interpretation  
Cartographic Techniques

Map Design  
Thematic Mapping  
Techniques in Remote Sensing

### At the International Business Machines Education Center

Job Entry Subsystem 3 (JES3) Operations  
IMS/VS Concepts and Facilities

CICS/VS Concepts and Facilities  
OS/VS VSAM Application Design Topics

### At the Office of Personnel Management

Fundamentals of Data Communications  
Systems Design Considerations in an  
On-Line Environment  
Seminar in Computer Systems Evaluation  
and Procurement  
Seminar in Advanced Computer Systems  
Technology  
Seminar in Distributed Data Processing

Audit and Control of On-Line Systems  
Seminar on Minicomputers  
Data Processing Project Management  
Design of Computerized Management  
Information Systems  
Computer Resources Management

### At the U.S. Department of Agriculture Graduate School

Teleprocessing and Data Communication Systems  
Systems Approach to ANS COBOL  
Systems 370 Virtual Storage Concepts and  
Operating Systems  
ADP Installation Management  
Computer Security and Privacy  
IBM System 360/370 Assembler Language Coding

Printing, Layout, and Design  
Graphic Methods of Presenting  
Statistics  
Introduction to Lithography  
Offset Photography

## SAMPLING AND STATISTICAL METHODS

Training objectives

This program has been developed to provide both theoretical instruction and practical experience in sample design and survey methodology for mathematical statisticians. Expertise in designing large-scale sample surveys and estimating population values from sample data normally is developed over a long period of application and experience combined with sound technical knowledge. The 1-year Sampling and Statistical Methods program enables participants to greatly improve both their understanding of the principles of statistical inference and their ability to apply such knowledge to actual design and evaluation of sample surveys and censuses for a broad range of subject-matter needs.

The program begins with theory necessary to provide a firm technical foundation, proceeds into application of the theory in specialized areas such as estimation and variance calculation, is supplemented throughout with courses in census and survey methodology, and culminates in the actual design of either an agricultural, socioeconomic, or establishment survey. Through an intensive workshop and field demonstration, participants also learn to plan, coordinate, and control all phases of censuses or surveys such as the one they designed.

Training plan

The 1-year program is divided into five training periods. The first four training periods include classroom work, seminars, conferences, and laboratory sessions. In the sampling seminars, sampling experts are invited to discuss topics of special interest to the participants; also, each participant reports on some aspect of sampling and statistical methods appropriate to his or her country. The fifth training period permits a choice of a socioeconomic or an agricultural statistics workshop and field demonstration. The workshops cover all aspects of planning and carrying out sample surveys or censuses, including experience in actual field listing and enumerating.

A recommended curriculum for participants specializing in Sampling and Statistical Methods appears on the next page. This curriculum assumes that participants specializing in sampling do not require Course 101, Introduction to Statistical Methods, or Course 102, Introduction to Survey Sampling, but they should expect to take all other ISPC courses in the 100 series. Sampling and Statistical Methods is the major area of training emphasis, but clearly related auxiliary fields and skills are included, such as mapping; design of tables, questionnaires, and other forms; and basic data processing operations. Statisticians interested in other courses may select from the list on pages 7 and 8 in accordance with their program objectives. Participants with a more advanced level of statistical training or experience receive some advanced training in design, analysis, and evaluation of sample surveys.

Duration

To receive a diploma it is necessary for the participant to complete the full 1-year program and earn 36 or more USDA Graduate School credits including specific required courses. Participants are advised to arrive about 10 days before classes begin on September 7, 1982. Short programs of  $7\frac{1}{2}$  or  $4\frac{1}{2}$  months (beginning in January or April, respectively) or for other brief periods are offered; however, participants should have previous education or experience equivalent to the training offered in the preceding periods (see section VI on page 4 for requirements for awarding certificates). Participants in the earlier training periods normally enroll in the sample survey workshop and field demonstration in the fifth period; however, separate enrollment for the fifth period can be arranged for those with appropriate background.

Candidate Requirements

As a minimum for the full 1-year program, participants must have completed a secondary school course in algebra and an elementary statistics course or its equivalent. Other academic training in statistics and mathematics is helpful. For the shorter programs of  $7\frac{1}{2}$  and  $4\frac{1}{2}$  months, candidates must have completed training equivalent to that shown on page 11 for the previous training periods. An absolute minimum requirement would be completion of courses in theory or design of sample surveys or equivalent experience. Most participants in this field hold a university degree. (For English language requirements, see page 5.)



COURSES AND WORKSHOPS\*

	Total class sessions**
<u>First training period--September 7 to October 13, 1982</u>	
104-1 Design of Sample Surveys.....	15
105-1 Survey Sampling Laboratory.....	5
600 Introduction to Design of Surveys and Censuses.....	15
<u>Second training period--October 18 to December 17, 1982</u>	
104-2 Design of Sample Surveys--Continued.....	30
105-2 Survey Sampling Laboratory--Continued.....	10
601 Introduction to Data Processing for Subject-Matter Specialists.....	15
602 Design of Tables and Questionnaires.....	30
604 Budgeting, Scheduling, and Controlling of Survey-Census Operations.....	15
<u>Optional:</u>	
203-1 Agricultural Survey Operations and Methods.....	10
405 Applications of Economic Survey-Census Techniques.....	10
<u>Third training period--January 3 to March 25, 1983</u>	
103 Applied Regression and Correlation Analysis.....	20
106 Variance Estimation in Sample Surveys.....	20
107 Laboratory in Variance Estimation Techniques.....	10
111 Introduction to the Analysis of Data.....	20
120-1 Field Demonstration Laboratory in Sampling and Statistical Methods.....	10
150-1 Seminar: Selected Topics in Sampling and Statistical Methods.....	10
605 Editing, Coding, and Imputation Principles.....	30
609 Workshop: Training for Statistical Activities.....	1 week
695 Special Programs in Statistical Technology.....	10
<u>Optional:</u>	
203-2 Agricultural Survey Operations and Methods--Continued.....	10
204 Agricultural Sample Survey Design.....	20
205 Frame Construction for Agricultural Samples.....	20
430 Economic Enterprise Survey: Field Demonstration Laboratory.....	10
603-1 Geography and Mapping for Surveys and Censuses.....	20
<u>Fourth training period--April 4 to June 17, 1983</u>	
108 Control and Evaluation of Nonsampling Error.....	20
109 Quality Control in Censuses and Surveys.....	10
110 Applications of Current Survey Design and Evaluation Techniques.....	20
120-2 Field Demonstration Laboratory in Sampling and Statistical Methods--Cont...	10
150-2 Seminar: Selected Topics in Sampling and Statistical Methods--Continued...	10
606 Management of Statistical Activities.....	20
608 Presentation, Publication, and Dissemination of Data.....	10
<u>Optional:</u>	
206 Objective Measurement of Area and Yield.....	30
308 Alternative Strategies for the Collection and Analysis of Demographic Data.	10
603-2 Geography and Mapping for Surveys and Censuses--Continued.....	20
<u>Fifth training period--June 20 to July 29, 1983</u>	
190 Case Study in Sampling: Workshop and Field Demonstration.....	Full time

\*Selection may be made from other courses listed on pages 7 and 8 to meet specific objectives. Where advisable, arrangements may be made for training in specialized topics not offered in the regular curriculum (see list of supplemental courses on page 9).

\*\*Each class session lasts 1½ hours; laboratory sessions are 2½ hours.

AGRICULTURAL STATISTICS  
(Based on Joint FAO/US Agricultural Statistics Training Program)

### Training objectives

This curriculum is designed to develop agricultural statisticians' abilities to provide reliable national and area totals or estimates of agricultural items regardless of who the data user might be. The agricultural statistician is considered to be the person in charge of all aspects of a survey whether performing the operations personally or through other people as a manager or coordinator. Therefore, participants are expected to learn agricultural, mapping, sampling, data processing and statistical system concepts.

Core objectives are to acquire working capability in planning, organizing and managing a survey; designing tables and questionnaires; developing specifications for sample design, mapping, and data processing specialists; constructing sampling frames and selecting samples; recruiting and training; controlling personnel, materials and supplies; controlling data from collection through editing, processing, and publication; manual editing and processing; making estimates; pre-publication data analysis; writing reports; documenting and evaluating a survey; objective measurement and forecasting; and other related functions.

Statisticians are trained for both censuses of agriculture with references to the FAO World Census of Agriculture Programme, and for current agricultural surveys whether continuing or one-time and regardless of scale. Other objectives are to understand and improve the agricultural data system in the participant's country, to understand the analysis and uses of statistics, to understand development planning concepts and the statistical requirements of planning, and to acquire the ability to train other people in survey data collection and analysis skills.

### Training plan

The Agricultural Statistics curriculum is an integrated program covering all aspects and steps in the development and conduct of a survey from conception through data publication, post-survey evaluation and data uses. These are presented a step at a time from September through June. Major activities covered in the core courses may be studied in depth in other courses presented only once in the training cycle. Most training is put into practice in a demonstration survey managed, developed and conducted by the participants as a group. The agriculture participants begin the planning and development of the agriculture survey in January. They are joined by data processing and sampling participants. Preparations continue in weekly workshops until June. Participants conduct, process, publish, and critique their survey in July. Course work and practical application build upon previous work and learning throughout the program.

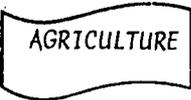
A recommended curriculum for Agricultural Statistics participants is shown on the next page. Agricultural Statistics is the major area of training emphasis, but related fields and skills are included. Other courses may be selected from the list on pages 7 and 8 in accordance with program objectives and within constraints imposed by the class schedule.

### Duration

To receive a diploma it is necessary for the participant to complete the full year's program and earn 36 or more USDA Graduate School credits including specific required courses. Participants are advised to arrive about 10 days before classes begin on September 7, 1982. Short programs of 7½ or 4½ months (beginning in January or April, respectively) or for other brief periods are offered; however, participants should have previous education or experience equivalent to the training offered in the preceding periods (see section VI on page 4 for certificate requirements).

### Candidate requirements

Participants must have a basic knowledge of agriculture concepts, algebra, and should have had at least a year's experience in agricultural statistics or rural development programs. Academic training in statistics, mathematics, and economics is very helpful. A university degree is desirable, although formal education may range from high school graduation to an advanced university degree. (For English language requirements, see page 5.)



COURSES AND WORKSHOPS\*

	Total class sessions**
<u>First training period--September 7 to October 13, 1982</u>	
201 Concepts and Tools for Agricultural Statistics.....	15
600 Introduction to Design of Surveys and Censuses.....	15
<u>Must choose either 101-1 or 104-1 and 105-1</u>	
101-1 Introduction to Statistical Methods.....	15
104-1 Design of Sample Surveys.....	15
105-1 Survey Sampling Laboratory.....	5
<u>Second training period--October 18 to December 17, 1982</u>	
102 Introduction to Survey Sampling.....	20
202 Economics of Agricultural Development.....	20
203-1 Agricultural Survey Operations and Methods.....	10
602 Design of Tables and Questionnaires.....	20 or 30
<u>Optional:</u>	
101-2 Introduction to Statistical Methods--Continued.....	30
104-2 Design of Sample Surveys--Continued.....	30
105-2 Survey Sampling Laboratory--Continued.....	10
601 Introduction to Data Processing for Subject-Matter Specialists.....	15
604 Budgeting, Scheduling, and Controlling of Survey-Census Operations.....	15
<u>Third training period--January 3 to March 25, 1983</u>	
203-2 Agricultural Survey Operations and Methods--Continued.....	10
204 Agricultural Sample Survey Design.....	20
205 Frame Construction for Agricultural Samples.....	20
208 Use of Agricultural Statistics in Economic Development Planning.....	10
220-1 Field Demonstration Laboratory in Agricultural Statistics.....	10
250-1 Seminar: Selected Topics in Agricultural Statistics.....	10
605 Editing, Coding, and Imputation Principles.....	20 or 30
609 Workshop: Training for Statistical Activities.....	1 week
695 Special Programs in Statistical Technology.....	10
<u>Optional:</u>	
103 Applied Regression and Correlation Analysis.....	20
111 Introduction to the Analysis of Data.....	20
603-1 Geography and Mapping for Surveys and Censuses.....	20
<u>Fourth training period--April 4 to June 17, 1983</u>	
108 Control and Evaluation of Nonsampling Error.....	20
109 Quality Control in Censuses and Surveys.....	10
206 Objective Measurement of Area and Yield.....	30
207 Agricultural Estimating Techniques.....	10
220-2 Field Demonstration Laboratory in Agricultural Statistics--Continued.....	10
250-2 Seminar: Selected Topics in Agricultural Statistics--Continued.....	10
606 Management of Statistical Activities.....	20
608 Presentation, Publication, and Dissemination of Data.....	10
<u>Optional</u>	
603-2 Geography and Mapping for Surveys and Censuses--Continued.....	20
<u>Fifth training period--June 20 to July 29, 1983</u>	
290 Case Study in Agricultural Statistics: Workshop and Field Demonstration... Full time	

\*Selection may be made from other courses listed on pages 7 and 8 to meet specific objectives. Where advisable, arrangements may be made for training in specialized topics not offered in the regular curriculum (see list of supplemental courses on page 9).

\*\*Each class session lasts 1½ hours; laboratory sessions are 2½ hours.

## DEMOGRAPHIC STATISTICS

Training objectives

The purpose of the Demographic Statistics curriculum is to provide training for persons who will have responsibility for demographic data collection or who will be engaged in research and analysis of demographic data. The training in this specialization is intended for professional personnel working in population censuses, household surveys, demographic surveys, fertility surveys, and vital statistics. Additionally, it is designed for statisticians responsible for estimating population levels, growth patterns, past and future trends.

In their Demographic Statistics courses, participants learn techniques for developing dependable demographic measures from incomplete and defective data as well as methods for improving the overall quality of demographic data and their collection. A course in civil registration methods is offered for those participants who specialize in the collection of vital statistics. In recognition of the importance of the publication and analysis of data, a new course has been added which focuses on the evaluation and analysis of census data, especially social and economic statistics. This course could be taken in conjunction with Course 111: Introduction to the Analysis of Data and Course 608: Presentation, Publication, and Dissemination of Data. It also is of vital importance that countries conduct continuing surveys to provide current population data; several courses (e.g., 308, 320, and 390) provide both training and firsthand experience in planning and implementing household sample surveys.

Training plan

The 1-year program is divided into five training periods. The first four training periods include classroom work, seminars, conferences, and discussion and laboratory sessions. The classroom work gives participants the basic knowledge and skills to collect and analyze demographic data. In the seminar, expert demographers are invited to discuss topics of special interest to the participants. Each participant also is responsible for the analysis of demographic data and the preparation of reports presenting the results of these analyses. To assist with the preparation of their reports and assignments, participants are introduced to the use of computer programs to facilitate demographic analysis. The fifth training period consists of a full-time workshop and field demonstration in socioeconomic sample surveys. The workshop reviews all aspects of planning and carrying out a multi-subject sample survey program--from determining the objectives of the survey, through sampling and field operations, to the analysis and publication of the data. The field demonstration involves the participant in an actual field exercise in a semi-rural area.

A recommended curriculum appears on the next page. Demographic Statistics is the major area of training but related auxiliary fields and skills are included, such as statistics, sampling and survey methods. Participants interested in other courses may select from the list on pages 7 and 8 in accordance with their program objectives.

Duration

To receive a diploma, it is necessary for participants to complete the full 1-year program and earn 36 or more USDA Graduate School credits including specific required courses. Participants are advised to arrive about 10 days before classes begin on September 7, 1982. Short programs of 7½ or 4½ months (beginning in January or April, respectively) or for other brief periods are offered; however, participants must have previous education or experience equivalent to the training offered in the preceding periods in order to be admitted into the Demographic Statistics curriculum. Participants wishing to specialize in Civil Registration and Vital Statistics may enroll for the first and second training periods only, or may enroll for the full 1-year program.

Candidate requirements

Participants must have a basic knowledge of algebra and should have some working experience (at least a year) in demographic statistics. Formal educational background may range from high school graduation to university degrees. Academic training in mathematics, statistics, sociology, and demography is especially helpful; a basic acquaintance with demographic measures is desirable but not required. (For English language requirements, see page 5.)

COURSES AND WORKSHOPS\*

		Total class sessions**
<u>First training period--September 7 to October 13, 1982</u>		
301	Population Dynamics and Introduction to Demographic Analysis.....	20
600	Introduction to Design of Surveys and Censuses.....	15
<u>Must choose either 101-1 or 104-1 and 105-1</u>		
101-1	Introduction to Statistical Methods.....	15
104-1	Design of Sample Surveys.....	15
105-1	Survey Sampling Laboratory.....	5
<u>Second training period--October 18 to December 17, 1982</u>		
102	Introduction to Survey Sampling.....	20
304	Techniques of Demographic Analysis: Mortality and Fertility.....	30
305	Demographic Analysis Laboratory.....	10
602	Design of Tables and Questionnaires.....	20
<u>Optional:</u>		
101-2	Introduction to Statistical Methods--Continued.....	30
104-2	Design of Sample Surveys--Continued.....	30
105-2	Survey Sampling Laboratory--Continued.....	10
303	Civil Registration and Vital Statistics Methods.....	20
601	Introduction to Data Processing for Subject-Matter Specialists.....	15
604	Budgeting, Scheduling, and Controlling of Survey-Census Operations.....	15
<u>Third training period--January 3 to March 25, 1983</u>		
306	Demographic Measures from Incomplete Data.....	40
307	Advanced Demographic Analysis Laboratory.....	10
310	Collection and Analysis of Migration Data.....	15
320-1	Population Field Demonstration Laboratory.....	10
605	Editing, Coding, and Imputation Principles.....	30
609	Workshop: Training for Statistical Activities.....	1 week
695	Special Programs in Statistical Technology.....	10
<u>Optional:</u>		
103	Applied Regression and Correlation: Analysis.....	20
111	Introduction to the Analysis of Data.....	20
603-1	Geography and Mapping for Surveys and Censuses.....	20
<u>Fourth training period--April 4 to June 17, 1983</u>		
108	Control and Evaluation of Nonsampling Error.....	20
308	Alternative Strategies for the Collection and Analysis of Demographic Data.	10
309	Workshop: Tabular Analysis of Census Data.....	10
311	Population Projections: Concepts and Applications.....	20
320-2	Population Field Demonstration Laboratory--Continued.....	10
350	Seminar: Selected Topics in Population and Demography.....	10
606	Management of Statistical Activities.....	20
<u>Optional:</u>		
608	Presentation, Publication, and Dissemination of Data.....	10
<u>Fifth training period--June 20 to July 29, 1983</u>		
390	Case Study in Demographic Statistics: Household Survey Workshop and Field Demonstration.....	Full time

\*Selection may be made from other courses listed on pages 7 and 8 to meet specific objectives. Where advisable, arrangements may be made for training in specialized topics not offered in the regular curriculum (see list of supplemental courses on page 9).

\*\*Each class session lasts 1½ hours; laboratory sessions are 2½ hours.

## ECONOMIC STATISTICS

Training objectives

The training program provides instruction in statistical concepts and operations necessary for the measurement and analysis of various branches of basic economic activity. Participants are given an opportunity to study applied concepts and techniques and to refine their knowledge of economic surveys and censuses. The objective is to prepare technicians to initiate or to improve national programs in industrial statistics, foreign trade statistics, distributive and service trade statistics, and measures of living standards associated with the household, depending on individual specialization.

Training plan

The 1-year program is divided into five training periods. The first four training periods include classroom instruction and laboratory sessions. During this time experts in economic statistics are occasionally invited to discuss topics appropriate to the curriculum. The first two periods cover a study of basic economic concepts, economic survey-census operations, and social accounting. The third training period features a demonstration economic survey, and the study of foreign trade statistical operations, and the measurement of living standards. The fourth training period includes the study of economic development, and a seminar on selected topics in economic statistics.

The entire fifth training period is devoted to a full-time socioeconomic survey workshop and field demonstration. Participants learn to plan, coordinate, and control various phases of a multi-subject household sample survey in which information is collected on level of living of the household and manpower characteristics of its members. The workshop reviews all aspects of planning and carrying out a household sample survey program--from determining the objectives of the program, through sampling and field operations, to the analysis and publication of the data. The field demonstration involves the participant in an actual field exercise in a semi-rural area.

A recommended curriculum for participants specializing in Economic Statistics appears on the next page. Economic Statistics is the major area of training emphasis, but clearly related auxiliary fields and skills are included, such as statistical sampling; survey methods; mapping; design of questionnaires, tables, and other forms; and basic data processing operations. Sufficient flexibility is incorporated into the program to allow participants who wish to include courses from other specializations to select from the list of courses on pages 7 and 8 in accordance with their program objectives.

Duration

To receive a diploma it is necessary for the participant to complete the full 1-year program and earn 36 or more USDA Graduate School credits including specific required courses. Participants are advised to arrive about 10 days before classes begin on September 7, 1982. Short programs of 7½ or 4½ months (beginning January or April, respectively) or for other brief periods are offered; however, participants should have previous education or experience equivalent to the training offered in the preceding periods (see section VI on page 4 for requirements for awarding certificates).

Candidate requirements

Participants must have a basic knowledge of algebra and should have some working experience (at least a year) in national statistical programs. Formal educational background may range from high school graduation to advanced university degrees. Academic training in mathematics, statistics, and economics is especially desirable. (For English language requirements, see page 5.)

COURSES AND WORKSHOPS\*

	<u>Total class sessions**</u>
<u>First training period--September 7 to October 13, 1982</u>	
401 Microeconomic Concepts for Statisticians.....	20
403 Elements of Economic Survey-Census Operations.....	20
600 Introduction to Design of Surveys and Censuses.....	15
<u>Must choose either 101-1 or 104-1 and 105-1</u>	
101-1 Introduction to Statistical Methods.....	15
104-1 Design of Sample Surveys.....	15
105-1 Survey Sampling Laboratory.....	5
<u>Second training period--October 18 to December 17</u>	
102 Introduction to Survey Sampling.....	20
402 Macroeconomic Concepts for Statisticians.....	20
405 Applications of Economic Survey-Census Techniques.....	10
406 Social Accounting.....	10
602 Design of Tables and Questionnaires.....	30
<u>Optional:</u>	
101-2 Introduction to Statistical Methods--Continued.....	30
104-2 Design of Sample Surveys--Continued.....	30
105-2 Survey Sampling Laboratory--Continued.....	10
601 Introduction to Data Processing for Subject-Matter Specialists.....	15
604 Budgeting, Scheduling, and Controlling of Survey-Census Operations.....	15
<u>Third training period--January 3 to March 25, 1983</u>	
103 Applied Regression and Correlation Analysis.....	20
407 Foreign Trade Statistical Operations.....	20
409 Measurement of Living Standards.....	10
420-1 Socioeconomic Field Demonstration Laboratory.....	10
430 Economic Enterprise Survey: Field Demonstration Laboratory.....	10
605 Editing, Coding, and Imputation Principles.....	30
609 Workshop: Training for Statistical Activities.....	1 week
695 Special Programs in Statistical Technology.....	10
<u>Optional:</u>	
111 Introduction to the Analysis of Data.....	20
603-1 Geography and Mapping for Surveys and Censuses.....	20
<u>Fourth training period--April 4 to June 17, 1983</u>	
108 Control and Evaluation of Nonsampling Error.....	20
410 Economic Development.....	10
420-2 Socioeconomic Field Demonstration Laboratory--Continued.....	10
450 Seminar: Selected Topics in Economic Statistics.....	10
606 Management of Statistical Activities.....	20
<u>Optional:</u>	
608 Presentation, Publication, and Dissemination of Data.....	10
<u>Fifth training period--June 20 to July 29, 1983</u>	
490 Case Study in Economic Statistics: Household Survey Workshop and Field Demonstration.....	Full time

\*Selection may be made from other courses listed on pages 7 and 8 to meet specific objectives. Where advisable, arrangements may be made for training in specialized topics not offered in the regular curriculum (see list of supplemental courses on page 9).

\*\*Each class session lasts 1½ hours; laboratory sessions are 2½ hours.

## COMPUTER DATA SYSTEMS

Training objectives

This training is designed to provide the knowledge and skills needed to qualify persons as systems analysts/programmers, project managers, ADP (Automatic Data Processing) managers, and supervisors of computer operations; to train analysts to evaluate software and hardware; and to upgrade the capabilities of persons already specializing in computer data systems. Although designed primarily to train personnel in government statistical offices in technical, analytical, and managerial functions, the program is flexible and adaptable to requirements of specialists in government banking systems or general-purpose computer centers.

Training plan

The 1-year program is divided into five training periods. Forms of instruction include classroom courses, laboratory sessions, supervised study, and individual projects. Program planning, design, and coding are regular components of computer language classes, and programs are tested on Census Bureau equipment, including an on-line terminal to an IBM 370 computer system. Assistance is provided in analysis, test deck preparation, and "debugging" of programs. The training in systems analysis and programming languages is related primarily to third generation, medium-scale computers, of which the IBM System 360/370 series is representative. Participants are instructed in adapting languages and procedures to other types of equipment appropriate to the facilities in their own countries. Knowledge and skill obtained in COBOL and FORTRAN are readily adaptable to various types of computers.

A recommended curriculum for specialists in Computer Data Systems appears on the next page. Computer Data Systems is the major area of training emphasis, but several essential related fields are included, such as basic statistical concepts, design of tables and questionnaires, editing, coding, and imputation principles, and control and evaluation of nonsampling errors. These related topics are considered necessary for better understanding of subject-matter concepts underlying the editing-tabulating procedures and better understanding of various statistical operations that precede the computer processes. Computer Data Systems participants who are interested in sampling and statistical methods can arrange their schedules to take additional courses in this specialization.

Participants may attend seminars or enroll in short courses at education centers or computer installations in the Washington area for training not included in the Census Bureau curriculum. Examples of such training are listed on page 9.

Duration

To receive a diploma it is necessary for the participant to complete the full 1-year program and earn 36 or more USDA Graduate School credits including specific required courses. Participants are advised to arrive about 10 days before classes begin on September 7, 1982. Short programs of 7½ or 4½ months (beginning in January or April, respectively) or for other brief periods are offered; however, participants should have previous education or experience equivalent to the training offered in the preceding periods (see section VI on page 4 for requirements for awarding certificates). Special programs covering topics not offered in the regular curriculum may be arranged as appropriate. Separate enrollment in the third and fourth periods may be arranged for the COCENTS and CONCOR courses and for the Systems Analysis and Management course for persons with appropriate background (see descriptions of Courses 505, 511, and 512).

Candidate requirements

Participants must have a basic knowledge of algebra. Although a secondary or higher level of education and some working experience in computer data systems are highly desirable, there are no specific data processing prerequisites for the basic courses that begin in September. Participants may also join the program at the beginning of the third training period (or later) if they have had some experience with computer systems. (For English language requirements, see page 5.)



COURSES AND WORKSHOPS\*

		Total class sessions**
<u>First training period--September 7 to October 13, 1982</u>		
501	Computer Processing Fundamentals.....	20
502	Fundamentals of Programming.....	20
600	Introduction to Design of Surveys and Censuses.....	15
<u>Must choose either 101-1 or 104-1 and 105-1</u>		
101-1	Introduction to Statistical Methods.....	15
104-1	Design of Sample Surveys.....	15
105-1	Survey Sampling Laboratory.....	5
<u>Second training period--October 18 to December 17, 1982</u>		
504	Concepts of IBM Systems 360/370.....	30
602	Design of Tables and Questionnaires.....	20
<u>Must choose 503 or 509 and either 102 or 104-2 and 105-2</u>		
102	Introduction to Survey Sampling.....	20
104-2	Design of Sample Surveys--Continued.....	30
105-2	Survey Sampling Laboratory--Continued.....	10
503	Computer Programming in Structured COBOL.....	60
509	Advanced Structured COBOL.....	60
<u>Third training period--January 3 to March 25, 1983</u>		
505	Systems Analysis and Management.....	30
520-1	Field Demonstration Laboratory in Systems Analysis.....	10
550-1	Seminar: Selected Topics in Computer Data Systems.....	10
605	Editing, Coding, and Imputation Principles.....	20
609	Workshop: Training for Statistical Activities.....	1 week
695	Special Programs in Statistical Technology.....	10
<u>Optional:</u>		
103	Applied Regression and Correlation Analysis.....	20
506	Disk Operating System (DOS) Concepts and Job Control Language (DOS JCL)....	30
507	Operating System (OS) Concepts and Job Control Language (OS JCL).....	30
509	Advanced Structured COBOL.....	60
512	CONCOR - Editing and Imputation System.....	30
<u>Fourth training period--April 4 to June 17, 1983</u>		
108	Control and Evaluation of Nonsampling Error.....	20
311	COCENTS - COBOL Census Tabulation System.....	40
520-2	Field Demonstration Laboratory in Systems Analysis--Continued.....	10
550-2	Seminar: Selected Topics in Computer Data Systems--Continued.....	10
606	Management of Statistical Activities.....	20
<u>Optional:</u>		
510	Data Base Design and Management.....	40
514	FORTTRAN IV Coding and Testing.....	40
515	Microcomputers and BASIC Programming.....	40
<u>Fifth training period--June 20 to July 29, 1983</u>		
590	Case Study in Computer Data Systems: Workshop and Field Demonstration..... Full time	

\*Selection may be made from other courses listed on pages 7 and 8 to meet specific objectives. Where advisable, arrangements may be made for training in specialized topics not offered in the regular curriculum (see list of supplemental courses on page 9).

\*\*Each class session lasts 1½ hours; laboratory sessions are 2½ hours.

## SURVEY METHODS

Training objectives

The purpose of the program is to equip participants with the wide range of skills required of the survey statistician in the design and implementation of surveys and censuses. The survey statistician has primary responsibility for specific tasks including design of tables and questionnaires, mapping, recruitment and training of data collection personnel, organization of field operations including procedures for control of nonsampling error, development of data processing specifications, and the presentation and dissemination of survey results. These skills will be the primary focus of the Survey Methods program.

An important part of the survey statistician's job is planning, scheduling, and overall coordination of the numerous tasks performed by subject-matter specialists, mathematical statisticians, and data processing personnel. Introductory and intermediate level courses in sampling, statistical methods, and data processing are therefore an integral part of the program. The design and operational skills which are central to this program can be readily applied to censuses or surveys in any subject-matter area. However, participants are encouraged to obtain a background in the concepts and content of one of the subject-matter areas.

Training plan

The 1-year program is divided into five training periods. The program strongly emphasizes practical applications of the theories and concepts presented in a lecture format. This is accomplished on two levels. In each course theories and concepts are discussed within the context of actual survey or census experience. Several courses use the seminar or workshop format with practical applications as the primary focus.

A key aspect of the ISPC program, the field demonstration survey, provides extensive practical experience on another level. In the third and fourth training periods participants specializing in Survey Methods join with participants in other specializations to design, plan, and conduct a field demonstration survey. This affords the participants the opportunity of working closely with participants in other areas of expertise, thus giving them a dimension of experience not usually available in regular coursework.

The recommended curriculum for participants specializing in Survey Methods appears on the next page. In accordance with the objectives of the program, the curriculum reflects the need for background in a wide range of areas. In addition to a sound grasp of survey methods and management techniques, the recommended program provides the participants with a working knowledge of sampling, statistical methods and data processing operations. Participants are also encouraged to take a related series of courses in a subject-matter area of their choice.

Duration

To receive a diploma it is necessary for the participant to complete the full 1-year program and earn 36 or more USDA Graduate School credits including specific required courses. Participants are advised to arrive about 10 days before classes begin on September 7, 1982. Short programs of  $7\frac{1}{2}$  months or  $4\frac{1}{2}$  months (beginning in January or April, respectively) or for other brief periods are offered; however, participants should have previous education or experience equivalent to the training offered in the preceding periods (see section VI on page 4 for requirements for awarding certificates). Participants in the earlier training periods normally enroll in the survey workshop and field demonstration in the fifth period; however, separate enrollment for the fifth period can be arranged for those with appropriate background.

Candidate requirements

Participants must have a basic knowledge of algebra and should have had some work experience (at least 1 year) in a statistical organization. The candidate should be a person who has, or will have, significant administrative or technical responsibility for a survey program. Since courses in sampling and statistical methods are a required part of this program, the completion of an elementary statistics course or its equivalent is especially desirable.



COURSES AND WORKSHOPS\*

		<u>Total class sessions**</u>
<u>First training period--September 7 to October 13, 1982</u>		
600	Introduction to Design of Surveys and Censuses.....	15
<u>Must choose either 101-1 or 104-1 and 105-1; other courses optional</u>		
101-1	Introduction to Statistical Methods.....	15
104-1	Design of Sample Surveys.....	15
105-1	Survey Sampling Laboratory.....	5
201	Concepts and Tools for Agricultural Statistics.....	15
403	Elements of Economic Survey-Census Operations.....	20
<u>Second training period--October 18 to December 17, 1982</u>		
601	Introduction to Data Processing for Subject-Matter Specialists.....	15
602	Design of Tables and Questionnaires.....	30
604	Budgeting, Scheduling, and Controlling of Survey-Census Operations.....	15
<u>Must choose either 101-2 and 102 or 104-2 and 105-2; other courses optional</u>		
101-2	Introduction to Statistical Methods--Continued.....	30
102	Introduction to Survey Sampling.....	20
104-2	Design of Sample Surveys--Continued.....	30
105-2	Survey Sampling Laboratory--Continued.....	10
203-1	Agricultural Survey Operations and Methods.....	10
405	Applications of Economic Survey-Census Techniques.....	10
<u>Third training period--January 3 to March 25, 1983</u>		
111	Introduction to the Analysis of Data.....	20
603-1	Geography and Mapping for Surveys and Censuses.....	20
605	Editing, Coding, and Imputation Principles.....	30
609	Workshop: Training for Statistical Activities.....	1 week
620-1	Field Demonstration Laboratory in Survey Methods.....	10
650-1	Seminar: Selected Topics in Survey Methods.....	10
695	Special Programs in Statistical Technology.....	10
<u>Optional:</u>		
103	Applied Regression and Correlation Analysis.....	20
203-2	Agricultural Survey Operations and Methods--Continued.....	10
310	Collection and Analysis of Migration Data.....	15
430	Economic Enterprise Survey: Field Demonstration Laboratory.....	10
<u>Fourth training period--April 4 to June 17, 1983</u>		
108	Control and Evaluation of Nonsampling Error.....	20
109	Quality Control in Censuses and Surveys.....	10
606	Management of Statistical Activities.....	20
608	Presentation, Publication, and Dissemination of Data.....	10
620-2	Field Demonstration Laboratory in Survey Methods--Continued.....	10
650-2	Seminar: Selected Topics in Survey Methods--Continued.....	10
<u>Optional:</u>		
206	Objective Measurement of Area and Yield.....	30
308	Alternative Strategies for the Collection and Analysis of Demographic Data.....	10
603-2	Geography and Mapping for Surveys and Censuses--Continued.....	20
<u>Fifth training period--June 20 to July 29, 1983</u>		
690	Case Study in Survey Methods: Workshop and Field Demonstration.....	Full time

\*Selection may be made from other courses listed on pages 7 and 8 to meet specific objectives. Where advisable, arrangements may be made for training in specialized topics not offered in the regular curriculum (see list of supplemental courses on page 9).

\*\*Each class session lasts 1½ hours; laboratory sessions are 2½ hours.

## CENSUS-SURVEY GEOGRAPHY

Training objectives

This special-purpose curriculum is designed to provide intensive practical instruction and extensive hands on experience in the application of the traditional manual and the latest automated cartographic techniques to problems faced by a census or survey mapping unit in a developing country.

A common and serious deficiency which hinders statistical offices in carrying out data collection is the lack of suitable maps. Often maps are either completely unavailable or those provided by other agencies do not meet the requirements of census or survey work. This requires that new maps be produced either by using information from a number of other sources or by such techniques as field sketching and tracing from aerial photographs. Using a small computer with suitable peripheral hardware and software can reduce the burden of such routine, but important, cartographic work. Computer-assisted small area geocoding of statistical data enables the linking of survey data with administrative records and other data files to produce analytical products of greater richness and value to data users. Producing publication maps that display statistical results effectively makes the results of statistical analysis easier for data users to grasp; this can be done using either manual or automated techniques. The Census-Survey Geography curriculum provides training for men and women who will have major technical responsibility for the application of both manual and automated technologies in the geography division of a developing country statistical office.

Training plan

The 1-year program is divided into five training periods. The first two are devoted to training in manual cartographic techniques. The focus will be on cartographic design considerations and general map production methods--proper use of cartographic symbols, lettering, use of cartographic equipment and materials, map design, and map reproduction. During this time, participants in the special Census-Survey Geography training program are introduced to elements of survey design and implementation to enable them to place their specialized skills within the broader context of an integrated statistical program. Introductory courses in statistical methods, sampling, and data processing provide the basis for more advanced applications included in the latter portion of the training program. The third and fourth training periods are devoted to intensive on-the-job training in the planning and implementation of statistical geography programs using state-of-the-art computer-based techniques. The training will be conducted in an automated cartography laboratory where participants will learn to use various types of equipment while working on actual projects of the Bureau of the Census as well as projects for their own countries. Participants in the special geography program may join with other ISPC participants in preparing maps for and actually conducting either an agricultural or a socioeconomic demonstration survey in a semi-rural area. Participants interested in taking university geography courses during evening hours in conjunction with this special program may do so. See an illustrative list of George Washington University courses on page 9.

Duration

To receive a diploma it is necessary to participants in this special program to complete the full 1-year curriculum. Participants interested only in manual cartographic techniques applied to census-survey mapping may be admitted for the first 4 months of the program. Participants are advised to arrive about 10 days before classes begin on September 7, 1982.

Candidate requirements

Because of the highly specialized and intensive nature of the Census-Survey Geography training program, candidate admission requirements are relatively strict. Only candidates with major responsibility for a statistical geography program will be considered. Preference will be given to applicants from statistical offices which have embarked on a program to substantially upgrade the capabilities of their mapping unit. Participants must have a knowledge of algebra and some working experience in a statistical mapping program. Academic training in geography or in statistics will be helpful, but is not required. (For English requirements, see page 5.)

## SHORT VISITATION AND CONSULTATION PROGRAMS

ISPC offers special-purpose study tours for officials of statistical and planning agencies, data processing centers, and related organizations. These short-term programs are especially well-suited for senior staff whose needs would not be met by regular ISPC training programs, as well as those who cannot be away from their offices for an extended period for varying reasons.

The average special-purpose study tour lasts 1 month; however, programs from a few days to several months duration can be arranged. They usually focus on selected aspects of economic or demographic survey-census operations including such topics as planning, field operations, budgeting, quality control, sampling, data processing, mapping, and statistical organization. Examples of some recent programs are the following:

An associate director of a statistical office which proposes to introduce new programs in economic statistics had a 2-week study tour including in-depth consultation on price competitiveness and statistics on shipping, ports and cargo in several subject-matter divisions of the Bureau of the Census and visits to the Bureau of Economic Analysis and Bureau of Labor Statistics.

A senior statistician interested in improving agricultural census methodology had a 1-month special program which included sessions at the Bureau of the Census and Department of Agriculture, 2 weeks at a midwestern university studying new crop forecasting methods, and a field trip to observe a crop harvest.

In addition to traditional areas of expertise of the Bureau of the Census, programs are available on topics such as the construction of social indicators and on the organization of statistical library and reference services.

The costs of these special-purpose programs vary with their complexity and length. Most range around \$250 per week, not including program-related travel and subsistence. Programs on survey methods include visits to the agencies performing the analysis and those that are the primary users of the data. Arrangements can be made for special study programs at universities and research centers in conjunction with consultation sessions at the Bureau. Most study tours consist of several visits to other governmental and nongovernmental agencies in order to provide a complete treatment of the subject. Although these programs are most often conducted in Washington, they frequently involve travel to other parts of the United States. The programs are most productive when they can be conducted in English. French and Spanish-language interpreter services can be provided at a substantial additional cost.

Requests for programs of this type should specify the objectives of the visit in as much detail as possible, listing the agencies and individuals to be visited where feasible. Address requests to--Chief, Information and Research Services Branch, International Statistical Programs Center, Bureau of the Census, Washington, D.C. 20233.

## WORKSHOP ON PLANNING AND IMPLEMENTING A HOUSEHOLD SURVEY PROGRAM

In June and July 1982 and again in June and July 1983, a workshop will be held at ISPC in Washington in support of the worldwide interest in developing national household survey capabilities and of the National Household Survey Capability Program (NHSCP) of the United Nations. The workshop is designed to assist survey statisticians and administrators in addressing practical problems of survey design, preparation, and implementation which are faced by developing countries in initiating a continuous, multi-subject household survey program. The workshop will be based on guidelines developed by the United Nations Statistical Office for the NHSCP, the Atlantida Case Study in Household Sample Surveys developed by ISPC, and selected reference materials actually used in developing countries which have instituted continuing multi-subject household survey programs recently. The topics to be covered during the workshop include establishing survey objectives and planning for the use of the data; making initial decisions about survey content and design; recruiting and training staff; organizing and controlling field operations; editing, coding, and tabulating survey results; and preparing and disseminating reports.

The 9-week workshop is divided into a 3-week lecture-laboratory-discussion phase followed by a 6-week demonstration socioeconomic household survey phase. Program charges for attending this workshop, excluding international travel and all subsistence, can be estimated at \$2,800. Participants should be nominated for this workshop following the procedures for other ISPC training programs (see page 6 of this booklet). This workshop is conducted in English (see page 5 for English language requirements). Other workshops conducted outside the United States in English, French, and Spanish will be announced by Census and Survey Methods Branch of ISPC.

## Description of Courses

The description below outlines the scope and content of each course, the training period in which it is offered, and the number of class sessions that are held. If the course covers

more than one training period, the number of class sessions is the total for the entire course. The courses present theory as needed but emphasize the application or practical aspects.

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### Sampling and Statistical Methods

#### 101 Introduction to Statistical Methods (First and Second -- 45 sessions)

This course is designed for participants who have had little or no training in statistics and whose major interest is in a field other than sampling. In Course 101-1 the purpose is to provide an understanding of elementary statistical concepts including frequency distributions, measures of central tendency and dispersion, probability, expected value, and the concept of sampling distributions. Course 101-2 continues this basic coverage while including the topics of confidence intervals and hypothesis testing.

#### 102 Introduction to Survey Sampling (Second -- 20 sessions)

Course 102 is designed for statisticians whose major interest is in a field other than sampling. It presents the same basic principles of survey sampling as Course 104, except that Course 102 is an abbreviated course with minimum use of mathematics. The topics include simple random sampling, systematic sampling, stratified random sampling, simple one- and two-stage cluster sampling, and ratio estimates. Also included are such topics as area sampling, control of variation in size of clusters for improved estimation, and optimum designs for a two-stage cluster sample when both cost and variance are considered.

#### 103 Applied Regression and Correlation Analysis (Third -- 20 sessions)

This course covers both simple linear regression and multiple regression. To facilitate the discussion of multiple regression, computer package programs will be used for computations. In addition to multiple regression, topics include polynomial regression, analysis of variance, use of indicator variables, multicollinearity, autocorrelation and "best" regressions. Throughout the course the emphasis will be on applications.

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#### 104 Design of Sample Surveys (First and Second -- 45 sessions)

This course presents the principles of survey sampling from both a mathematical and an applied viewpoint. In the first training period, Course 104-1 covers basic statistical theory, simple random sampling, and simple stratified sampling. In the second training period, Course 104-2 covers simple one- and two-stage cluster sampling, stratified single- and multi-stage sampling, ratio estimation, difference and regression estimation, double sampling, and sampling for time series.

#### 105 Survey Sampling Laboratory (First and Second -- 15 sessions)

The purpose of the laboratory is to enable the participant to apply simple survey design methods and theory to practical problems. Simulated problems relevant to a developing country have been designed to demonstrate techniques learned in Course 104. The sessions also provide an opportunity for the participant to strengthen the ability to use statistical tools, such as mathematical expectation, needed for understanding the fundamental theory on which sampling is based.

#### 106 Variance Estimation in Sample Surveys (Third -- 20 sessions)

This course covers variance estimation techniques which have been designed to simplify calculation and reduce the costs of variance estimation for the more complex sample designs. The topics that are described include ultimate cluster estimates, random group method, McCarthy's half-sample replications, Tukey jack-knife replications, and Taylor's series approximations.

#### 107 Laboratory in Variance Estimation Techniques (Third -- 10 sessions)

The purpose of the laboratory is to enable the participant to apply practical variance estimation techniques to the solution of problems that are relevant to a developing country. Participants are given simulated data from which estimates are made.

108 Control and Evaluation of Nonsampling Error (Fourth -- 20 sessions)

This course covers "total error" in sample surveys and censuses, introduces the basic mean square error model, and provides various methods that can be used to estimate the parameters of the model. When sampling is involved in data collection, both sampling and non-sampling errors exist. However, since sampling error is covered in other courses, the emphasis of this course will be on nonsampling errors. The treatment will cover methods for their control and reduction in the preparatory, data collection, processing and publication stages of a survey (or census) and methods for evaluating the effects of the remaining errors in the final results. Actual sample survey and census case studies will be used to illustrate control and evaluation techniques.

The course is designed to provide basic information required for a full understanding of the logic underlying specific quality control techniques provided in Course 109.

109 Quality Control in Censuses and Surveys (Fourth--10 sessions)

This course covers statistical quality control and its application in a statistical system. Whereas Course 108 identifies error sources and describes general control and evaluation techniques, Course 109 provides specific quality control procedures to be implemented. The primary objective is to provide the participants with a working knowledge of construction and use of Shewhart control charts and the fundamentals of acceptance sampling in a survey situation. Particular emphasis is given to the study of how quality control procedures can be employed in data collection and data processing operations since these are the major sources of error in census or survey data.

110 Applications of Current Survey Design and Evaluation Techniques (Fourth -- 20 sessions)

This course illustrates actual application of sampling principles in design of surveys and censuses for many different subject areas. In addition, actual applications of different types of post-enumerative surveys and evaluative studies are covered. This is accomplished through study of case histories involving sample censuses, one-time sample surveys, and continuing sample surveys for subject areas such as population, labor force, housing, agriculture, and industry.

111 Introduction to the Analysis of Data (Third -- 20 sessions)

This course introduces participants to techniques of exploratory data analysis as well as some of the more traditional statistical techniques used in the analysis of data. Emphasis is placed on the application of basic statistical tests to aid in interpreting data obtained in a census or survey. Special attention is paid to developing methodological skills in interpretation of data to answer informational requirements of policymakers and other users. Throughout the course, attention is given to how these techniques can and should be used in the preparation of statistical statements.

120 Field Demonstration Laboratory in Sampling and Statistical Methods (Third and Fourth -- 20 sessions)

Participants jointly prepare the technical plans and materials to be used in a sample survey workshop and field demonstration. These include preparation of a sample design; formulation of plans for collecting, processing, and tabulating data; preparation of such materials as table outlines, edit specifications, and instruction manuals for all field operations; and setting up quality control techniques for various operations. The technical knowledge needed to prepare plans and materials will have been acquired in the courses studied earlier; the purpose of the laboratory, therefore, is to apply this knowledge in preparing for an actual survey demonstration. Specialists in sampling may choose to participate in the agricultural sample survey or the socio-economic sample survey together with participants in agricultural statistics, demographic statistics, economic statistics, computer data systems, and survey methods (see Courses 220, 320, 420, 520 and 620).

150 Seminar: Selected Topics in Sampling and Statistical Methods (Third and Fourth -- 20 sessions)

The participant, working under the guidance of the staff sampling adviser, reports on some aspect of sampling and statistical methods appropriate to his or her country, using the skills acquired from previous sampling and statistical courses. Additionally, experts in sampling applications are invited to discuss topics of interest to the participants.

190 Case Study in Sampling: Workshop and Field Demonstration (Fifth -- 6 weeks full time)

The case study presents techniques for organizing and conducting multi-purpose household sample surveys, with particular emphasis on demographic and economic characteristics, or an agricultural survey. The workshop begins with an intensive 2-week study, with discussion and class exercises. The primary objective is to study the inter-relationships between the various skills and techniques needed to implement a survey program and how they can be adapted to the country's needs; the detailed technical knowledge for the various operations will have been acquired earlier in the curriculum. The topics discussed during the workshop include the following: (a) objectives of a survey, (b) content and design, (c) sample design, (d) field operations, (e) distribution and receipt of survey materials, (f) editing and coding, (g) tabulation processes, (h) evaluation of survey procedures and review and analysis of data, and (i) publication and dissemination of survey results.

An important part of the training is the 4-week field demonstration, which gives the participant firsthand experience in locating the sample segments, listing, interviewing, reinterviewing, editing and coding, tabulating, evaluating the results, and preparing a survey data release.

### **Agricultural Statistics**

201 Concepts and Tools for Agricultural Statistics (First -- 15 sessions)

Basic concepts relating to agricultural statistics are covered in this course. Food and Agriculture Organization concepts will be emphasized including such topics as holder, agricultural household, dependents, crops, livestock, agricultural labor, income, wealth, tenure and so forth. Other topics discussed include scope and coverage of censuses and surveys, timing, legislation, and the establishment of priorities for the collection of different types of data.

202 Economics of Agricultural Development (Second -- 20 sessions)

The course places special emphasis on the role of agriculture in national economic growth, particularly in developing countries. The principles and elementary

tools of economic analysis applicable to developmental theory are studied, as well as the effects of technological improvements, institutional arrangements, and other factors associated with economic progress in agriculture. The effects of rapid population growth on economic development are discussed as well as future self-sufficiency in food. Economic problems in agriculture are identified, and the development of research procedures for the analysis of these problems is discussed. Uses of agricultural census and survey data in development planning are covered in the course.

203 Agricultural Survey Operations and Methods (Second and Third -- 20 sessions)

In this course the survey cycle, from the recognition of data needs through the review and analysis of the completed survey, is covered. Major emphasis is placed on planning and survey operations, and topics discussed include the statistical organization, scheduling operations, monitoring the survey, making estimates, and publishing the results. Comparisons between current survey and census operations also are covered.

204 Agricultural Sample Survey Design (Third -- 20 sessions)

Various sample designs can be used for the collection of agricultural data. The purpose of this course is to demonstrate actual application of sample design principles and execution of them in the United States and developing countries. Area frame sampling is developed, using the June Enumerative Survey design, as applied by the U.S. Department of Agriculture, as an example. Extensions of the area frame design, including multiple frame and interpenetrating (replicated) samples with specific applications to developing countries also are discussed. Prerequisite: adequate knowledge of 104-1 and 104-2 or 102.

205 Frame Construction for Agricultural Samples (Third -- 20 sessions)

Participants study the various activities connected with area sample frame construction. These include techniques in map and satellite data interpretation, stratification, and measurement of areas from maps for the purpose of delineating counting units and identifying boundaries. Participants study the selection of sample counting units, using a stratified simple random sample, a systematic sample selection procedure, and an interpenetrating sample. Estimating methods are discussed briefly to place these topics in perspective.

206 Objective Measurement of Area and Yield  
(Fourth -- 30 sessions)

In many countries, respondents are unable to give even reasonable estimates of field size or total land area in their holdings. A possible solution is objective measurement of each. Techniques include measurement of distances, angles, and elevation, and sketching of the area under survey. Estimating area from maps and aerial photography and the use of sampling techniques for area measurement (including point sampling) are discussed.

As with land measurement, respondents often cannot report good measures of crop production; again, objective measurement is a practical technique. The course covers methods of objectively measuring yield for (a) cereal crops such as wheat and rice, (b) row crops such as maize and cotton, and (c) tree fruits and nut crops such as apples, citrus fruits, and filberts. Topics covered include sample design and selection, field procedures, crop-cutting, forecasting, and estimation procedures. Examples of techniques used in developing countries are discussed. Participants have an opportunity to do some actual measurement in connection with the field work.

207 Agricultural Estimating Techniques  
(Fourth -- 10 sessions)

This course covers the process of transforming survey results into publishable estimates of crop and livestock production. Practical examples using census data, other survey results, check data, regression and time series charts are covered. Emphasis also is placed on the use of statistics on agricultural inputs (fertilizer, machinery, agricultural labor, etc.) in measuring current productivity and efficiency.

208 Use of Agricultural Statistics in Economic Development Planning  
(Third -- 10 sessions)

In this course participants learn to apply the concepts and theories of economic development presented in Course 202. Discussions include how agricultural data are used in effective measurement and evaluation of agricultural development projects. Measurement tools to be introduced are cost-benefit analysis, discounted present value, internal rates of return, and shadow pricing. Participants will get experience by evaluating an agricultural project using one or more of these techniques.

220 Field Demonstration Laboratory in Agricultural Statistics  
(Third and Fourth -- 20 sessions)

Participants jointly prepare the technical materials and procedures to be used in the Field Demonstration (Course 290). These include the survey questionnaire and forms, field instruction manual, table outlines, sample design for selecting enumeration units, tabulation plans, and quality control techniques for the various operations. The technical knowledge needed to prepare plans and materials will have been acquired in the courses studied earlier; the purpose of the laboratory, therefore, is to apply this knowledge in preparing for an actual survey demonstration.

250 Seminar: Selected Topics in Agricultural Statistics  
(Third and Fourth -- 20 sessions)

This seminar comprises a series of discussions on various topics related to agricultural statistics and general economic development. For the most part, topics to be discussed are suggested by the participants themselves. The seminar will include reports given by the participants on some aspect of agricultural statistics appropriate to their countries, as well as lectures given by experts in agricultural statistics. Participants should bring with them to be discussed in this seminar reference and illustrative materials to describe their country, job, a survey technique, or a statistical or economic problem.

290 Case Study in Agricultural Statistics: Workshop and Field Demonstration  
(Fifth -- 6 weeks full time)

The 2-week workshop will continue the work of the field demonstration laboratory as needed. In particular, participants will carry out training for the field enumeration, data handling and processing to take place in the final 4 weeks.

A 4-week field demonstration involves the participants in conducting an actual agricultural sample survey in a rural farming area for the purpose of putting into practice their earlier classroom training. Materials and procedures developed during the Field Demonstration Laboratory in Agricultural Statistics, such as survey

questionnaires and forms, instruction materials, procedures for selection of sample enumeration areas, and table formats, are utilized during the field demonstration. In the field demonstration, participants carry out the principal activities involved in collecting agricultural statistics. They (a) enumerate a sample of holdings; (b) edit, code, and tabulate the data; (c) analyze the tabulations; (d) prepare estimates and a current survey data release; and (e) prepare a survey analytical report with recommendations for improvement of the survey.

## Demographic Statistics

### 301 Population Dynamics and Introduction to Demographic Analysis (First -- 20 sessions)

This course provides an overview of the world demographic situation as well as an introduction to the principles of demographic analysis. In the first portion of the course, the determinants and consequences of population trends are considered from various perspectives. Emphasis is given to the important relationships between population trends and social, economic, and ecological problems in developing countries. In the second portion, emphasis is placed on the measurement objectives of demographic data collection. Procedures used to estimate the components of population change are introduced.

### 303 Civil Registration and Vital Statistics Methods (Second -- 20 sessions)

Birth and death statistics, based on civil registration, are an important source of demographic and health data. Based on these data, trends in fertility, mortality, and population growth may be estimated for use in social and economic planning. Vital statistics data also provide information for the planning and evaluation of health and population programs. This course will emphasize the methods of organizing and operating a civil registration and vital statistics system, including the legal basis for such a system, organizational structures, design of documents and forms, storage and retrieval of information, coding and processing of statistical data, and analysis of data at an elementary level.

### 304 Techniques of Demographic Analysis: Mortality and Fertility (Second -- 30 sessions)

Basic methods of demographic analysis provide the fundamental methodology for evaluation and analysis of population data of varying quality and scope. This course presents basic methods for analysis of population composition, fertility, and mortality, including an introduction to the construction and use of the abridged life table and to selected general methods, e.g., interpolation, cohort analysis. Attention is given to the requirements for good data and consideration of the major types of error. Examples of practical applications are used throughout the course.

### 305 Demographic Analysis Laboratory (Second -- 10 sessions)

In this supervised statistical laboratory, participants complete exercises which give them practice in the desk calculator computation of the elementary demographic measures of population composition, fertility, and mortality which are introduced in Course 304. Emphasis is on the practical aspects of the calculation of basic demographic functions using data from the participant's own country whenever they are available. Participants also are introduced to the use of the electronic computer for the computation of abridged life tables and various other demographic measures.

### 306 Demographic Measures from Incomplete Data (Third -- 40 sessions)

In a number of countries, there are major deficiencies in the quantity and quality of population data that are available as a basis for estimating fundamental demographic measures. Participants learn techniques for estimating measures of the population composition, fertility, and mortality from limited and incomplete data. Emphasis is placed on the use of model life tables, Brass techniques for estimating levels of mortality and fertility, and "own children" and pregnancy history techniques for estimating fertility. Techniques for evaluating the quality of data and making appropriate adjustments also are discussed.

### 307 Advanced Demographic Analysis Laboratory (Third -- 10 sessions)

Participants complete laboratory exercises, using data for their own countries, to give them practical experience in the application of the more advanced techniques of demographic analysis. Participants are encouraged to use computer programs for demographic analysis to

assist them with their calculations. The laboratory is conducted in conjunction with Course 306, Demographic Measures from Incomplete Data.

308 Alternative Strategies for the Collection and Analysis of Demographic Data (Fourth -- 10 sessions)

A fundamental knowledge of the size and direction of population change is needed for social and economic planning on a national scale. Current demographic information required to estimate population change is often difficult to find during intercensal periods, or when censuses have not been taken. This course introduces several plans and methods to measure population change and particularly vital events where such information either does not exist, is statistically unreliable, or is outdated. Emphasis is placed on the dual record collection system, multi-round surveys, and single-round surveys such as the World Fertility Survey, and the types of demographic analysis that stem from each type of data collection system.

309 Workshop: Tabular Analysis of Census Data (Fourth -- 10 sessions)

The purpose of this workshop is to familiarize participants with basic principles of tabular analysis and report writing and to provide them with an opportunity to apply many of the techniques they have learned in previous courses to specific research problems involving social, demographic, and economic data commonly available from censuses and surveys.

310 Collection and Analysis of Migration Data (Third -- 15 sessions)

High fertility levels and the resulting rapid rate of population growth usually have been identified as the population problem of developing countries. Recently, however, increased attention has been paid to the effects of massive flows of migrants to the cities in these countries. In the first part of this course, the participant is introduced to the practical application of techniques for measuring internal and international migration. Indirect methods for estimating migration rates when migration data are incomplete or unreliable are emphasized. In the second portion of the course, special emphasis is placed on the design and methodology of migration surveys. Consideration also is given to strategies for the analysis of migration data coming from this type of survey.

311 Population Projections: Concepts and Applications (Fourth -- 20 sessions)

The course covers the component method for the preparation of projections of the size and composition of the population. It also deals with procedures for preparing population estimates by age and sex for use as controls for the development of ratio estimates from surveys. Participants will have the opportunity to practice the preparation of population projections at the national and subnational level, including special projections of households and families, labor force, and school enrollment. Participants will be introduced to the use of computer programs for the preparation of projections. Data from the participants' countries are used in the exercise.

320 Population Field Demonstration Laboratory (Third and Fourth -- 20 sessions)

Participants jointly prepare the technical materials and procedures to be used in the Field Demonstration (Course 390). These include the survey questionnaire and forms, field instruction manual, table outlines, sample design for selecting the enumeration units, editing and tabulation plans, and quality control techniques for the various operations. The technical knowledge needed to prepare plans and materials will have been acquired in the courses studied earlier; the purpose of the laboratory, therefore, is to apply this knowledge in preparing for an actual survey demonstration.

350 Seminar: Selected Topics in Population and Demography (Fourth -- 10 sessions)

The seminar comprises a series of discussions on various topics related to population or demography. It is designed to expand participants' knowledge on various topics and techniques of demographic analysis not regularly included in other scheduled courses. These topics are intended to familiarize participants with various types of demographic research and to provide them with an opportunity to learn how specific techniques can be applied to situations in developing countries.

390 Case Study in Demographic Statistics: Household Survey Workshop and Field Demonstration (Fifth -- 6 weeks full time)

Concepts and procedures for collecting demographic data in a multi-subject household sample survey are brought together within the context of a case study and are presented in a

2-week workshop. The primary objective of the workshop is to study the interrelationships between the skills and techniques needed to implement a multi-subject household survey program. Applications of field techniques are accomplished in the 4-week field demonstration.

## Economic Statistics

### 401 Microeconomic Concepts for Statisticians (First -- 20 sessions)

The objective of this course is to introduce microeconomic phenomena of the market place. Discussion includes the economic aspects of consumption and production, marginal and indifference curves, market classifications, price and nonprice competition, and examples of these and other microeconomic phenomena in developing countries.

### 402 Macroeconomic Concepts for Statisticians (Second -- 20 sessions)

This course is an introduction to the macroeconomic variables that make up a nation's economy and the role of macroeconomics in economic development. The first half of the course examines exchange systems, the economic role of government, national product and national income measurement, and an introduction to Keynesian economics. The second half of the course deals with country-specific examples of macroeconomic variables and economic development.

### 403 Elements of Economic Survey-Census Operations (First -- 20 sessions)

The course emphasizes the need for economic surveys and censuses in terms of uses of statistical data for decision making by governments and business communities. It develops an understanding of the individual elements which make up a successful survey or census, such as the need for and development of an establishment directory, and the importance of complete coverage and quality data. Alternative operational elements are investigated; for example, alternative methods of collecting data from economic units based on socioeconomic conditions of the country.

### 405 Applications of Economic Survey-Census Techniques (Second -- 10 sessions)

The course develops an understanding of the application of individual elements which make up an economic survey or census. Selected portions of the Providencia Case Study for Economic Censuses and several United Nations and U.S. Census Bureau publications are used with emphasis given to distributive trades and services. Techniques and applications will be both discussed and implemented in preparation for a field exercise in the next training period.

### 406 Social Accounting (Second -- 10 sessions)

This course examines the concepts underlying a system of social accounting, the construction of social accounting matrices, and the use of social accounting matrices in planning for economic development.

### 407 Foreign Trade Statistical Operations (Third -- 20 sessions)

The basic operations of a foreign trade statistics program are studied. Included are such topics as data collection, processing and flow of documents, sampling techniques, data preparation, review and analysis and timely presentation of data. Emphasis is placed on the continuous coordination and control requirements to successfully produce foreign trade statistics.

### 409 Measurement of Living Standards (Third -- 10 sessions)

One of the fundamental goals of economic development is improvement of the standard of living. This course examines the methodology for measuring living standards, identifies the kinds of data which can be collected most usefully, and describes the use of data on living standards as a basis for national economic policy decisions.

### 410 Economic Development (Fourth -- 10 sessions)

This course is designed to introduce both content and historical concepts associated with the development process and economic planning. Included in the course are the development of economic models and the application of economic statistics for research, analysis, and policy making.

420 Socioeconomic Field Demonstration Laboratory (Third and Fourth -- 20 sessions)

Participants jointly prepare the technical materials and procedures to be used in the socioeconomic household survey field demonstration (Course 490). These include the survey questionnaire and forms, field instruction manual, table outlines, sample design for selecting enumeration units, tabulation plans, and quality control techniques for the various operations. The technical knowledge needed to prepare plans and materials will have been developed in the courses studied earlier; the purpose of the laboratory, therefore, is to apply this knowledge in preparing for a survey-census demonstration.

430 Economic Enterprise Survey: Field Demonstration Laboratory (Third -- 10 sessions)

In the field demonstration laboratory, participants prepare materials, develop procedures, and conduct an economic enterprise survey applying techniques learned in Course 405. The laboratory also provides the participants the opportunity to evaluate the results of the field exercise.

450 Seminar: Selected Topics in Economic Statistics (Fourth -- 10 sessions)

The seminar is comprised of a series of discussions on various topics related to economic statistics and economic development. For the most part, topics to be discussed are suggested by the participants. The seminar may include reports given by the participants on some aspect of economic statistics appropriate to their countries, as well as lectures given by experts in economic statistics.

490 Case Study in Economic Statistics: Household Survey Workshop and Field Demonstration (Fifth -- 6 weeks full time)

Knowledge of the level of living of households is needed for social and economic planning in countries with scarce resources. Concepts and procedures for planning and conducting economic sample surveys of households are brought together within the context of a case study and are presented in a

2-week workshop, with particular emphasis on obtaining data on labor force participation and consumer income and expenditures. A major part of the workshop deals with the interrelationships between the skills and techniques needed to implement a multi-subject household survey program. Applications of field techniques are accomplished in the 4-week field demonstration.

## Computer Data Systems

501 Computer Processing Fundamentals (First -- 20 sessions)

This course is designed to familiarize the participant with numbering systems, data formats, and use of data processing techniques; also tools such as flowcharts, decision tables, and printer spacing charts. Computer components, input/output devices, and types of computer language and programming systems are discussed.

502 Fundamentals of Programming (First -- 20 sessions)

This course introduces the participant to problem definition and analysis, problem-solving techniques, and procedural documentation. The participant is given practice in analyzing simple data processing problems, preparing programming flowcharts, and printer layout charts. The participant also learns to chart input and output operations, loops, switching routines, and branches.

503 Computer Programming in Structured COBOL (Second -- 60 sessions)

The participant learns by theory and practice the Common Business Oriented Language (COBOL) and its applications. The following operations or programming techniques are taught: basic input/output, addition, subtraction, editing, multiplication, division, the COMPUTE verb, comparing, nested IF statement, single- and multiple-level control breaks,

and table lookup and table search. Structured program design and coding are emphasized. The course is taught around a series of problems for which the participant designs, codes and tests a solution. Emphasis is placed on giving each participant as much practical experience on a computer as possible with the instructor offering counseling assistance.

504 Concepts of IBM Systems 360/370  
(Second -- 30 sessions)

Major topics covered in this course include the central processing unit, program execution, programming systems, input-output channels, and control units and devices. Special attention is given to the specific hardware that will be available to participant technicians during their training.

505 Systems Analysis and Management  
(Third -- 30 sessions)

The course is designed to give the participant preliminary training for future responsibilities as a systems analyst, project leader, or manager of an ADP installation. It describes extent and tasks of systems analysis which, in an ADP installation, deal with the analysis of the job requirements and the design of a data processing system to meet these requirements. Topics include the analyst's role in assisting in the designing of a questionnaire or source document; design of record formats and table formats; and planning of clerical and computer operations required, such as coding, editing, sorting, and tabulating. The training emphasizes the principles and techniques of systems analysis and design, feasibility studies and their use, and the establishment of controls and standards for insuring accuracy and timeliness in data processing.

506 Disk Operating System (DOS) Concepts and Job Control Language (DOS JCL)  
(Third -- 30 sessions)

The purpose of this course is to enable the participant to acquire in-depth understanding of the Disk Operating System (DOS). Topics that are covered include the development of a program in the DOS system and the respective roles played by the language translators, data management facilities, and the linkage editor program. In addition, the execution of a program is studied with respect to functions of the DOS Control Program, which consists of the initial program loader (IPL), the supervisor program, and the job control program.

This course also presents the functions of the Job Control Language (JCL) for DOS. The participant learns to use the JCL for simple jobs, then progresses to more advanced techniques utilizing the core image and relocatable libraries, as well as those techniques that are concerned with device independence and multi-programming.

507 Operating System (OS) Concepts and Job Control Language (OS JCL)  
(Third -- 30 sessions)

In this course, the participant acquires a basic knowledge of the concepts of the more complex and powerful Operating System (OS) and the facilities that it provides. Functional areas within the OS are covered; these include job management, task management, and data management. Control program options, including multi-programming with a variable number of tasks (MVT), are discussed.

The Job Control Language also is presented for the Operating System (OS). Emphasis is placed on the use of this control language to best utilize OS to create and retrieve data sets organized by the sequential, indexed sequential, and direct access methods. Catalogued procedures and OS utilities such as SORT/MERGE, IEBGENER and IEBISAM are also presented.

509 Advanced Structured COBOL  
(Second or Third -- 60 sessions)

This course further develops the structured design and coding techniques taught in Course 503. The course is taught around a series of problems for which the participant designs, codes, and tests a solution. Problems illustrate the following concepts: input editing, sequential disk output, use of two input files and matching, sequential file updating, creation of an indexed sequential file, random updating, and retrieval of an indexed sequential file. Emphasis is placed on giving each participant as much practical experience on a computer as possible with the instructor offering counseling assistance.

510 Data Base Design and Management  
(Fourth -- 40 sessions)

The participant will be introduced to concepts of information storage, classification, and retrieval. Areas covered will include structures, access methods, keyed files, indexing, maintenance, reorganization, error-handling, links, addressing algorithms, and search strategies.

511 COCENTS - COBOL Census Tabulation System (Fourth -- 40 sessions)

The COBOL Census Tabulation System (COCENTS) is a software system designed to accelerate census processing and reduce the time required to write computer programs and tabulate a census by as much as 50 percent compared with the usual methods. Participants study the concepts involved in the software in order to adapt the system to their countries' needs. Additionally, they learn how to prepare parameter cards which utilize the capabilities of the software. Although designed primarily for population and housing censuses, the system is applicable to agricultural censuses, household sample surveys, and many other statistical programs.

512 CONCOR - Editing and Imputation System (Third -- 30 sessions)

The CONCOR data editing system is designed to be a general-purpose software tool for the identification and correction of invalid or inconsistent data in various types of surveys and censuses. The concepts involved in the software are studied by the participants in order to adapt the system to their countries' needs. They learn how to prepare the parameter cards in order to use the capabilities of the software.

514 FORTRAN IV Coding and Testing (Fourth -- 40 sessions)

The course enables the participant to write complete programs for application in FORTRAN IV, using basic input/output features. The participant codes and tests the programs. Topics that are covered include basic concepts, FORTRAN constants and variables, arithmetic statements, function statements, and processing control including basic input/output considerations, loop control, subscripting, and subprograms.

515 Microcomputers and BASIC Programming (Fourth -- 40 sessions)

This course is designed to give the participant a practical, working knowledge of microcomputers and an understanding of their capabilities and their limitations. The BASIC programming language will be taught and subsequently used to illustrate the various applications of microcomputers. The features of microcomputers and the associated BASIC language will be shown through the methods available for inputting and outputting data both from a hardware and software standpoint. Language features will be discussed including

comparing and branching, looping, array utilization, and the use of functions and subroutines. With this exposure to the hardware and software, a solid foundation in microcomputers and their applications will be established.

520 Field Demonstration Laboratory in Systems Analysis (Third and Fourth -- 20 sessions)

Participants jointly prepare the technical materials and procedures to be used in planning and processing the Field Demonstration Survey (Course 590). These include questionnaire layout, control forms, coding systems, tabulation outlines, decision tables, flow charts, and quality control procedures. The technical knowledge needed to prepare plans and materials will have been developed in the courses studied earlier; the purpose of the laboratory, therefore, is to apply this knowledge in preparation for an actual census-survey demonstration.

550 Seminar: Selected Topics in Computer Data Systems (Third and Fourth -- 20 sessions)

This seminar comprises a series of discussions of various topics related to computer data systems. Research in this area is accomplished by the participants; reports are given by each participant and discussed by the entire group. These reports pertain to some aspect of data processing appropriate to the participant's country. Outside experts may be called upon to give a highly specialized presentation on some phase of computer technology.

590 Case Study in Computer Data Systems: Workshop and Field Demonstration (Fifth -- 6 weeks full time)

The workshop is designed to give the participant practical experience in the analysis of the data processing operation and the design of a system for a specific illustrative survey, emphasizing input preparation, updating processing techniques, and maintenance of controls. During the field demonstration, the computer specialist joins the subject-matter specialists in an actual sample survey operation in the field; the field work involves not only data collection but also editing, processing, and evaluation of the results. The workshop and field experience give the computer data systems analyst the opportunity to utilize, in a practical way, the knowledge gained throughout the training program.

## Survey Methods

### 600 Introduction to Design of Surveys and Censuses (First -- 15 sessions)

This course will provide an introduction to the major steps involved in the initial process of designing a census or survey. The course will focus on the basic design features which are common to all surveys and censuses, regardless of subject-matter content. These include specification of objectives, consideration of budget and sample limitations, decisions about which variables should be measured and how, and selection of methods for collecting and processing data. The course will stress the interrelationships among different survey activities and how these must be taken into account when decisions are made about overall design. The interdependent nature of various activities will be illustrated through the use of flow charts and operations calendars.

The treatment of major aspects of the survey-census process given in this course will help participants to fully understand the role of other survey methods courses in the ISPC program.

### 601 Introduction to Data Processing for Subject-Matter Specialists (Second -- 15 sessions)

The objective of this course is to teach participants the fundamentals of computer technology; it strives to develop an awareness of the capabilities and restrictions involved in the use of the computer as a processing tool. The participant becomes familiar with the functions and interrelations of the major computer components and acquires a working grasp of the unique technical language used in the data processing area. The course emphasizes the importance of communication between the subject-matter specialist and the data processing systems analyst in assuring the processability of the data that are collected in surveys and censuses. Class exercises illustrate the function of record layouts, table specifications, and computer program diaries.

### 602 Design of Tables and Questionnaires (Second -- 20 or 30 sessions)

This course covers the principles and techniques used in the development of questionnaires, forms, and statistical tables for surveys and censuses. Participants learn how to translate subject-matter concepts into questions designed to elicit accurate

responses which fulfill survey objectives. Each step in questionnaire design is discussed in detail. Laboratory sessions are an important part of the course since they enable participants to practice applying the principles learned to actual development of questionnaires. Guidelines for tabular presentation and the basic components of the statistical table are introduced. The importance of preparing table outlines and defining concepts very early in the survey planning process is stressed; otherwise the questionnaire may fail to produce the desired results.

Apart from the mechanics of questionnaire design, the course attempts to convey an understanding and appreciation of the role of questionnaire development in the overall design of the survey or census. A major theme throughout the course is the ways in which questionnaires may produce incomplete or inaccurate responses. This must be understood so that these problems can be avoided in designing questionnaires.

### 603 Geography and Mapping for Surveys and Censuses (Third and Fourth -- 40 sessions)

A study is made of the geographic aspects of survey and census work, especially practical methodology in the use of maps in preparing for and carrying out surveys and censuses. The course points out the importance of recordkeeping when compiling maps for the purpose of delimiting areas for which statistical information is to be collected. The use of maps for area sampling is covered. Field survey methods and the techniques of map drafting and reproduction are outlined and explained. The importance of developing skills in map reading and interpretation for data collection field operations is emphasized. Graphic presentation of statistical data is studied by means of practical exercises in plotting and preparing statistical maps and charts. Alternative procedures to be used when adequate maps are not available also are discussed.

### 604 Budgeting, Scheduling, and Controlling of Survey-Census Operations (Second -- 15 sessions)

This course is designed for participants who have significant management responsibilities in their jobs. The purpose of the course is to give participants an understanding of the planning process and to equip them with the practical skills that the manager needs in this area. Considerable time is devoted to understanding the steps involved in effective planning, including definition of objectives, progress monitoring, and the use of corrective measures where appropriate. Individual and group exercises are used extensively to teach

topics such as estimating time and staffing requirements, preparation of schedules and budgets, and development of operational control systems. Applications of flowcharting and network techniques (PERT/CPM) to planning problems also are covered.

605 Editing, Coding, and Imputation Principles (Third -- 20 or 30 sessions)

The objective of this course is to teach the principles of editing, coding, and imputation. A combination lecture-laboratory approach is used to illustrate the applications of these principles to manual and computer-assisted editing of data. Participants learn the importance of clear, written specifications and of close coordination between the subject-matter and computer staffs in data processing operations. The desirability of minimizing the need for manual processing by maximizing the use of the computer will be emphasized. The following topics are examined in detail: deciding the scope and content of editing operations, procedures for resolving errors, preparation of clerical editing instructions and specifications for computer editing, organization and control of the flow of work, and quality control of processing operations.

The course also covers coding operations required to transform information into numerical form so that it can be processed. Alternative methods of imputation for item non-response also will be introduced.

606 Management of Statistical Activities (Fourth -- 20 sessions)

This course examines in detail the four basic functions of a manager in a statistical organization: planning, organizing, directing, and controlling. An overview of management thought and theory provides the basis for defining the roles of the manager. Leadership styles and their relationship to employee motivation also are studied. Emphasis is given to aiding participants in acquiring personal skills in planning and the effective use of time. Techniques for planning and organizing continuous work functions of small organizational units are discussed. The Management-Communication Seminar, which all participants are scheduled to attend during the latter part of this course, serves as the basis for discussion of directing and controlling. Throughout the course, topics are presented in a variety of ways intended to make the classroom experience as close as possible to the real work world.

608 Presentation, Publication, and Dissemination of Data (Fourth -- 10 sessions)

This course covers the role of the statistical report in a survey-census operation. Methods of effectively presenting data are discussed, including the functions of text, tables, and graphics, and the application of standards for the presentation of errors. The assembly, production, and distribution of statistical reports also is discussed. Participants are encouraged to take this course in conjunction with Course 111, Introduction to the Analysis of Data.

609 Workshop: Training for Statistical Activities (Third -- 1 week full time)

Improvement of training is one of the best ways a statistical organization can enhance the timeliness and quality of its data. Participants in this workshop identify those statistical activities for which training is required, they examine the ways adults learn, determine the types of training materials that are needed, and study effective instructional techniques. The role of the training staff and the functions performed by the staff are developed. Emphasis is on practical exercises designed to improve skills in classroom instruction and planning and preparation of training materials.

620 Field Demonstration Laboratory in Survey Methods (Third and Fourth -- 20 sessions)

Participants jointly prepare the technical materials and procedures to be used in the Field Demonstration (Course 690). These include the survey questionnaire and forms, field instruction manual, table outlines, sample design for selecting the enumeration units, editing and tabulation plans, and quality control techniques for the various operations. The technical knowledge needed to prepare plans and materials will have been acquired in the courses studied earlier; the purpose of the laboratory, therefore is to apply this knowledge in preparing for a demonstration survey.

Participants enrolled in the survey methods specialization may choose to work on the agricultural sample survey or the multi-subject household survey together with participants in sampling, agricultural statistics, demographic statistics, economic statistics, and computer data systems (see Courses 120, 220, 320, 420, and 520).

650 Seminar: Selected Topics in Survey  
Methods (Third and Fourth --  
20 sessions)

Participants in the survey methods specialization, working under the guidance of their staff training adviser, do research on various topics related to statistical technologies which are appropriate for use in their countries. Based on his or her research, each participant gives a report that is discussed by the entire group. Outside experts also are called upon to give specialized presentations to the participants on some aspects of statistical technology.

690 Case Study in Survey Methods:  
Workshop and Field Demonstration  
(Fifth -- 6 weeks full time)

Concepts and procedures for collecting data are discussed within the context of a case study and are presented in a workshop format. The workshop is an intensive 2-week study with discussion and class exercises. The primary objective is to bring together the detailed technical knowledge acquired earlier in the curriculum in the various aspects of survey operations. The following topics are covered in the workshop: survey design; developing questionnaires and tables; planning, scheduling and budgeting; sample design and selection; field operations and control of materials; coding, editing, and tabulation processes; review and analysis of data; and preparation of a survey data release.

The workshop is followed by a 4-week field demonstration, in which all of these operations are implemented in an actual survey.

695 Special Programs in Statistical Technology  
(Third -- 10 sessions)

In periodic special programs, participants in all specializations are introduced to new developments in statistical technology which are available and may be adapted for use in their respective countries. Current topics of special interest in the area of applied statistics are also discussed by guest speakers.

The topics of special programs vary and will be announced during the training year. Possible topics include practical applications of aerial photography and satellite remote sensing to statistical programs; design of evaluation studies to assess the impact of improvement of rural roads, rural electrification, and the provision of potable water; advantages and limitations of longitudinal surveys to measure demographic and socio-economic change; and recent research and methodological developments at the U.S. Census Bureau in the control and evaluation of non-sampling error.

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**George  
Washington  
University**



**Graduate School  
of Arts and Sciences**

offers an interdisciplinary degree program leading to the Master of Science in Special Studies with a concentration in

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**Social**

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**and**

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**Economic**

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**Statistics**

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**1982-1983**

This program is open only to students participating in the Statistical Training Program offered at the International Statistical Programs Center of the U.S. Bureau of the Census.

It is administered by GWU's Division of Continuing Education and Summer Sessions.

The George Washington University, located in the District of Columbia, had its beginning with the approval of its congressional charter by President James Monroe in 1821. It is a private, nonsectarian university dedicated to "the aspiration of Washington, Jefferson, and Madison for the erection of a University at the seat of the federal government." Over the years, it has worked to develop the university ideal in the nation's capital and to meet the changing needs of society while continuing to pursue the traditional principles of learning and research. It has developed as a major national university with strong traditional ties to the federal community in Washington, D.C., as well as growing involvements in international areas.

The University has accepted the challenge to develop each student's potential abilities to the fullest extent. Its enrollment is coeducational, and admission is determined only on the basis of personal character and academic qualifications. The University's total program is founded on a broad base of the liberal arts and sciences and expanded into more specialized areas through upper level, graduate, and professional study and research programs. The equivalent of twelve thousand and six hundred full-time students are enrolled annually in the 11 colleges, schools, and divisions of the University.

GWU's Graduate School of Arts and Sciences directs advanced study and research in the arts and sciences leading to the Master of Arts, Master of Science, and Doctor of Philosophy degrees. The University has offered graduate programs since 1905. Recently the graduate school introduced a new type of degree program, providing a more flexible approach to graduate study which may relate to several of the traditional academic disciplines. Such programs are directed toward a goal defined by the students involved and approved by the graduate school. Course work is scheduled to provide a structured sequence of study toward this goal. Students completing such programs are awarded either the Master of Arts in Special Studies or Master of Science in Special Studies degree.

## THE DEGREE

The George Washington University's Graduate School of Arts and Sciences offers an interdisciplinary degree program leading to the Master of Science in Special Studies degree with a concentration in Social and Economic Statistics. The program is designed to give persons involved in official statistical activities a knowledge of the theories, concepts, principles, and literature of social and economic statistics; to enable these persons to

increase their potential for analytic creativity and intellectual inquiry; to help them stay abreast of their field of specialization; and to provide them with a background in management leadership and staff development in organizations devoted to the planning and implementation of statistical analyses.

Qualified students must pursue this degree in conjunction with the course of instruction at the International Statistical Programs Center (ISPC) of the U.S. Bureau of the Census. At the present time, it is available only to students in the ISPC Statistical Training Program. Each student must satisfactorily complete the entire selected ISPC program; the ISPC program is not reduced for a student taking the combined program.

This combined master's degree and Statistical Training Program (the Combined Degree Program) is a very demanding undertaking designed for highly motivated, mature students who want to make their leaves of absence from their professional positions as productive as possible. In order to complete the combined program, students must schedule a four-month extension, through December 1983, of the leave of absence.

University courses offered as a part of this program are open only to ISPC students. Advisers from both the University and ISPC meet regularly to coordinate the course work from the various disciplines. Although courses in the Combined Degree Program are offered at the graduate level, it is expected that some students have not had normal introductory courses in all areas during undergraduate study; when necessary, instructors present needed review material during initial class meetings, and supplementary reading assignments are suggested for students who require additional preparation. In certain instances, students may be required to take preparatory course work.

There are no language (other than English) or thesis requirements for this degree. During the last semester of course work, a master's comprehensive examination, in the form of a written essay, is given on campus to enable the student to demonstrate understanding of the integrated and coordinated nature of the diverse subject matter.

## THE CURRICULUM

The Combined Degree Program in Social and Economic Statistics requires a total of 36 semester hours of graduate course work. This includes both University course work and credit granted for work satisfactorily completed through the ISPC Statistical Training Program.

A participant satisfactorily completing the entire selected ISPC program also acquires necessary prerequisites for certain University courses.

The following University courses are required and must be completed with a minimum cumulative grade average of B (3.00).

<i>Course</i>	<i>Semester Hours</i>
Psychology 244: THEORIES AND PROCESSES OF MANAGEMENT The basic functions and techniques of organizational management—designing, controlling, directing, decision-making—examined from the viewpoint of behavioral science.	3
Psychology 245: SEMINAR: ORGANIZATIONAL BEHAVIOR Analysis of organizational behavior, emphasis on motivation and productivity. Recent research on employee attitudes, primary group, supervisory leadership, formal and informal organization, job design.	3
Sociology 351: SELECTED TOPICS IN SOCIOLOGY (CENSUS ANALYSIS AND SOCIAL DEVELOPMENT) Intensive investigation of special topics in sociology. The sociological implication of census analysis in the scheme of economic progress in developing countries.	3
Economics 251: ECONOMIC DEVELOPMENT THEORIES Basic theories of economic growth and development. Emphasis on theories inspired by the underdevelopment process.	3
Economics 252: ECONOMIC DEVELOPMENT PLANNING Development planning techniques and practice at both the macro and micro levels. Macro-planning tools analyzed include input/output, multi-sector models, simulation, and linear programming. Micro-planning includes the use of cost-benefit techniques in project analysis. Prerequisite: ECON 251.	3
In consultation with the academic advisory committee, each student selects one of the following on-campus courses:	
Economics 275: ECONOMETRICS I: INTRODUCTION	3
Management Science 241: INFORMATION SYSTEMS DEVELOPMENT AND APPLICATION	3
Public Administration 252: PUBLIC EXPENDITURE ANALYSIS AND PLANNING	3
Sociology 230: SOCIOLOGICAL RESEARCH METHODS	3
Statistics 201: MATHEMATICAL STATISTICS	3

Statistics 287: MODERN THEORY OF SAMPLE SURVEYS 3

Degree program applicants whose English-language fluency is marginal will be required to satisfactorily complete a remedial English course during their first Fall semester. All participants in the Combined Degree Program will be enrolled in a reading improvement and library research techniques course during the Spring semester.

By satisfactorily completing the following portions of the ISPC Statistical Training Program students in the Combined Degree Program earn additional academic credits toward the requirements of the master's degree:

ISPC 602: SURVEY DESIGN

Applications of survey methodology, including questionnaire design and wording, field methods, interviewer and nonresponse biases, and quality control procedures. Problems in sample frame development. (GWU Statistics 193) 3

ISPC 190, 290, 390, 490, 590, or 690: TOPICAL SOCIOLOGICAL CASE STUDIES AND SAMPLE SURVEYS (GWU Sociology 295) 3

ISPC 103: APPLIED REGRESSION AND CORRELATION ANALYSIS (GWU Statistics 118) 3

Finally, a participant satisfactorily completing the remainder of the selected ISPC Statistical Training Program receives nine semester hours of advanced standing toward the master's degree when all other degree requirements have been met.

Total Semester Hours	9
	36

Students who do not complete the degree program receive George Washington University transcript credit for individual University courses satisfactorily completed. These credits may be transferred to other colleges and universities, provided they meet the requirements of these colleges and universities.

This uniquely designed curriculum in no way diminishes the objectives of ISPC's regular program. Rather, it is a natural companion to the practical skills and applications developed by the participants in the ISPC program.

#### ADMISSIONS

Students applying for admission to degree candidacy in the Combined Degree Program must meet the entrance requirements of the Graduate School of Arts and Sciences. A bachelor's degree from a recognized college or university is required. Preference in admission is given to those students with the strongest credentials and most appropriate undergraduate preparation. Applicants are not required to take the Graduate Record Examination.

Students who come from a country whose official language is not English should take the Test of English as a Foreign Language (TOEFL). Students who have earned a bachelor's degree or higher degree from a university in an English-speaking community may omit the test. Information on TOEFL may be obtained from the local American embassy. In some countries, tests may be given only once or twice a year. The George Washington University will arrange additional diagnostic testing in English language proficiency for any student upon arrival in Washington, D.C.

All students must submit transcripts and letters of reference.

### SCHEDULE AND LOCATION

The Combined Degree Program requires 16 months of study beginning September 7, 1982 and ending in late December 1983. It is an intensive educational challenge which should be attempted by only the most dedicated and energetic student.

During the first 12 months students complete their full ISPC Statistical Training Program, as well as some of the GWU course study. During this time, the GWU courses meet during the early evening hours. During the last four months, students complete the Combined Degree Program as full-time students with George Washington University. To alleviate commuting problems, both the ISPC program and the GWU degree program are offered at the ISPC facility. During the four-month extension, however, certain courses may be offered on the University campus in downtown Washington, in order to give the students direct contact with an American university.

### FINANCIAL REQUIREMENTS

Tuition for the graduate degree program is based on the group contract fee schedule of the University, which allows reduced rates for groups based on the economies of larger enrollments. Individual tuition depends on the number of registrations from the group, with the exact fee determined when courses begin.

For students not sponsored by the Agency for International Development, a reasonable estimate for the Combined Degree Program, including application fee, tuition, books, and graduation fee, is \$2,800. This amount excludes living costs and any expenses connected with the ISPC Statistical Training Program.

For students sponsored by AID, the standard AID allowance for non-academic participants applies. The allowance for the four-month extension is allocated to the Combined Degree Program costs and the student's subsistence.

### APPLICATION PROCEDURE

Persons who desire to apply for the Combined Degree Program should submit a letter of intent to ISPC no later than May 31, 1982 containing the following information:

- 1) full name and country
- 2) mailing address
- 3) age, sex, marital status
- 4) field of specialization (population, agriculture, economics, sampling, computer data systems, or survey methods)
- 5) education (including degrees)
- 6) employment experience
- 7) TOEFL test results (if applicable)

Applicants sponsored by the Agency for International Development, the United Nations, the Food and Agricultural Organization, or the Organization of American States should forward the letter of intent through usual channels; it should accompany the application or nomination for the ISPC Statistical Training Program. Applicants sponsored by other organizations should send the letter of intent directly to ISPC.

As soon as the letter of intent requesting admission to the Combined Degree Program is received, an official application form is sent to each person. This form should be completed and returned directly to ISPC. An official transcript, in English, from each college or university attended and four letters of reference are required. Applicants and/or their sponsors should immediately make arrangements to have these items forwarded directly to ISPC. The Center coordinates all admissions materials and forwards them directly to the George Washington University, together with a non-refundable fee of \$25 per applicant.

Admission to the graduate degree program is determined after the official application, certified transcripts, and reference letters are received and reviewed. Also the grade results for the first and second training period ISPC courses are reviewed. Applicants are advised of their admission after this review procedure and, in most cases, admission status is announced by mid-January 1983. If an applicant does not qualify for admission to the degree program, both applicant and sponsor are notified as promptly as possible. Non-acceptance for the Combined Degree Program does not affect the applicant's consideration for admission to the ISPC Statistical Training Program.

All correspondence should be addressed to:  
 Chief, Training Branch  
 International Statistical Programs Center  
 U.S. Bureau of the Census  
 Washington, D.C. 20233 U. S. A.

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# Georgetown University

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The Graduate  
School

The Demography Department and Center for  
Population Research offer a degree program  
leading to the

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# Master of Arts in Demography

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1982 - 1983

This program is open to students participating in  
the Statistical Training Program offered at the  
International Statistical Programs Center of the  
U. S. Bureau of the Census.

**F**ounded in 1789, Georgetown University is one of the oldest institutions of higher learning in the United States, granting its first degree in 1821. It contains schools of law, medicine, dentistry, nursing, arts and science, foreign service, languages and linguistics, business administration, and continuing education, as well as the Graduate School. A basic objective of the Graduate School is to provide opportunities for the advanced study of theoretical and practical disciplines, thereby seeking to prepare students for careers of leadership and service in teaching, government, private industry, and research.

### THE DEMOGRAPHY DEGREE PROGRAM

The aim of the master's degree program in demography is to provide intensive graduate training and research in demography and related disciplines. Fulfillment of the degree requirements entitles the degree candidate to receive the Master of Arts in Demography degree. The degree requirements consist of:

#### (a) Course requirements

A minimum of 24 graduate credits of coursework is required. For the successful completion of each course the student earns 3 credits. The following courses are required of all students: General Demography, Techniques of Demographic Analysis I and II, Methods of Social Research I and II, Principles of Biostatistics I, and two (selected by the student) of the following three courses - Fertility, Mortality, and Migration. The student may choose from a variety of graduate courses in demography and other disciplines to complete the required number of course credits. A minimum average grade of "B" is required to remain in good standing.

#### (b) Comprehensive examination

Each candidate for the M.A. degree must pass a written examination, which covers the fields of general demography, research methods, techniques of demographic analysis, as well as the topics of fertility, mortality, and migration.

#### (c) Thesis or nonthesis option

Each student must *either* (1) submit a master's thesis on an approved topic in demography, or (2) complete an additional 6 credits of approved graduate work, for a total of at least 30 graduate credits. In addition, the student selecting the nonthesis option must submit a research paper of high quality for the approval

of the faculty. This paper must demonstrate an ability to do professional demographic analysis and to report the results in an appropriate style and clear English. The master's thesis or the research paper is written near the end of the student's training.

#### (d) Language requirement

There is no language requirement other than proficiency in the English language.

#### (e) ISPC program requirements

Students must satisfactorily complete the entire course of instruction in Demographic Statistics offered by the International Statistical Programs Center (ISPC) of the U.S. Bureau of the Census. This program should include, in addition to the demographic curriculum requirements, satisfactory completion (or equivalent experience) in ISPC courses 103-Applied Regression and Correlation Analysis- and 111-Introduction to Data Analysis. Students will then receive 12 graduate credits fulfilling the requirements for Techniques of Demographic Analysis I and II, Methods of Social Research I, and Principles of Biostatistics I, provided that they have achieved a grade of "B" or better in ISPC courses. ISPC students will begin their work toward the degree concurrently with their study in the ISPC program. ISPC courses are given during the day, and the University demography courses are given in the evening. During the months of ISPC coursework, students will take only one University course during each of the fall and spring semesters, and another course during the first summer session. The remaining degree requirements are to be completed in the 6 months following completion of the ISPC program. Students study full-time during this period, completing the remaining required coursework from September through December. The last two months are devoted to taking the comprehensive examination and completion of the master's thesis or research paper. Thus, the total time needed to complete ISPC training program and the Georgetown University M.A. in Demography is 18 months.

### THE CURRICULUM

In addition to the courses on the techniques of demographic analysis, research methods, and statistics, for which ISPC students will receive

credit when they successfully complete the ISPC program, other required University courses are:

#### 149-501 GENERAL DEMOGRAPHY

Survey of the major substantive, methodological, and theoretical topics in demography in historical perspective. Population issues and policy.

Students must take two of the following three courses:

#### 149-704 FERTILITY

Problems of data collection and fertility measurement. Causal models in the analysis of fertility. Biologic, demographic, and socio-economic determinants of fertility and fertility control.

#### 149-708 MIGRATION

Major internal and international population movements. Sources of data, methods of analysis, differentials, selectivity, motivation, and assimilation. Social and economic causes and effects. Demographic aspects of urbanization. Governmental regulation.

#### 149-450 SOCIO-ECONOMIC ASPECTS OF MORTALITY DIFFERENTIALS

Analyses of mortality differentials by sex, age, areas, causes of death, and population groups with particular socioeconomic characteristics. National and international studies, as well as differences between developed and developing countries, will be analyzed.

#### OTHER COURSES OFFERED INCLUDE:

- 149-503 METHODS OF SOCIAL RESEARCH I
- 149-415 ECONOMIC-DEMOGRAPHIC RELATIONS
- 149-516 POPULATION GROWTH/ECONOMIC DEVELOPMENT IN LATIN AMERICA
- 149-691 DEMOGRAPHY OF THE USSR
- 149-693 POPULATION AND SOCIAL CHANGE IN THE MIDDLE EAST
- 149-490 POPULATION AND THE AMERICAN FUTURE
- 149-901 SPECIAL TOPICS IN DEMOGRAPHY
- 149-902 TUTORIAL IN DEMOGRAPHY

Students who do not complete the degree program will receive transcript credit for the University courses satisfactorily completed. These credits may be transferred to other

colleges and universities provided that they meet the requirements of those institutions.

#### ADMISSION REQUIREMENTS

Students applying for admission to the Demography Degree Program must meet the entrance requirements of the Georgetown University Graduate School. A bachelor's degree with acceptable achievement from a recognized college or university is required. Applicants are not required to take the Graduate Record Examination.

Students whose native language is not English are required to take the Test of English as a Foreign Language (TOEFL) or the ALIGU examination offered by the Georgetown language program. A score of at least 550 on the TOEFL (or the equivalent on the ALIGU examination) must be obtained. Information on TOEFL may be obtained from the local American Embassy, or students may take the examination upon their arrival in Washington. Students whose English language proficiency does not meet university standards will be required to take intensive language training before being admitted to the graduate program.

#### SCHEDULE

The program requires 18 months of study beginning September 7, 1982 and ending in late February 1984. If possible, participants should attempt to arrive in Washington two to three weeks earlier in order to get settled prior to the beginning of classes.

#### FINANCIAL REQUIREMENTS

The cost for students in the program is estimated at about \$6000. This includes application fee, tuition, and graduation fees. It excludes the cost of the ISPC training program and living costs and other expenses incurred during the six-month extension needed to complete the degree requirements.

#### APPLICATION PROCEDURE

Applications for admission to the degree program are normally evaluated at the end of the first semester of study. Students intending to apply for the program will take the General Demography course at Georgetown by enrolling through the School of Continuing Education; credit for the course will be applied to the degree if the student achieves a grade of "B" or better and is admitted to the program. Evaluation of applications for admission will also take

into consideration students' performance on first semester courses at ISPC. (301-Population Dynamics and Introduction to Demographic Analysis; 101 - Introduction to Statistical Methods/102-Introduction to Survey Sampling or 104 -Design of Sample Surveys /105 - Survey Sampling Laboratory; and 304 -Techniques of Demographic Analysis: Mortality and Fertility/305-Demographic Analysis Laboratory). A grade of "B" or better is required for these courses in order to be admitted.

Students who intend to apply for the degree program should notify ISPC in advance of their arrival, and obtain an official transcript in English from each college or university attended and three letters of recommendation. Georgetown University requires at least two letters from former college or university teachers who can evaluate the applicant's academic ability. Forms for these recommendations can be obtained from ISPC, and should be returned to ISPC. Officials at ISPC will assist students in completing the remaining admission requirements during their first semester of study.

Admission to the program is determined after all admission documents have been received and

after the performance of the student in first semester courses has been evaluated. Under most circumstances applicants and their sponsors can be advised of their admission status in early February 1983. Applicants who are not accepted for the degree program may continue in the ISPC diploma program in Demographic Statistics.

Participants who have previously received a diploma from ISPC in Population Statistics and Demographic Analysis also may apply for admission by following the procedures outlined above. It is possible for ISPC graduates entering the program to earn the M.A. Degree in Demography in less than 18 months. However, appropriate schedules should be arranged on an individual basis for each former participant applying for the degree program.

All correspondence should be addressed to:

**CHIEF, TRAINING BRANCH  
INTERNATIONAL STATISTICAL  
PROGRAMS CENTER  
U.S. BUREAU OF THE CENSUS  
WASHINGTON, DC 20233 USA**