

# DEPARTMENT OF POPULATION SCIENCE AND HUMAN RESOURCE DEVELOPMENT



**Syllabus for B.Sc (Honours) 2013-2014**

**Examination Years**

**Part-I: 2014**

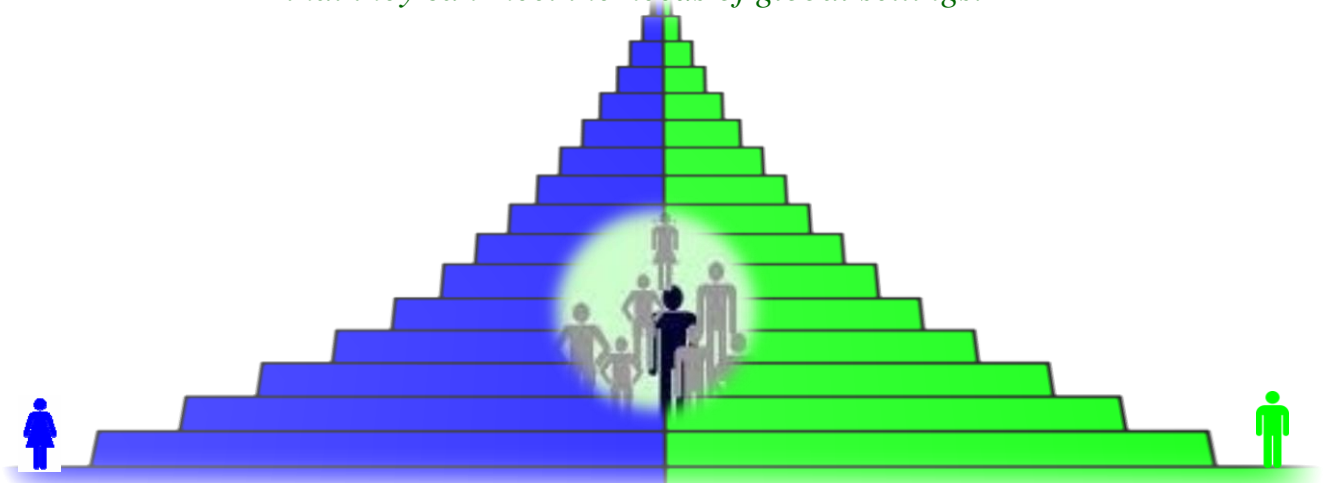
**Part-II: 2015**

**Part-III: 2016**

**Part-IV: 2017**

## ***Vision***

*The vision of the Department of Population Science and Human Resource Development is to make human/graduates as resource by providing necessary education and skills so that they can meet the needs of global settings.*



## ***Mission***

*The mission of the Department is to generate quality graduates in each and every area of demography and human resource development by providing necessary knowledge of mathematics, statistics, economics, health, environment, and computer programming along with advanced research.*

**UNIVERSITY OF RAJSHAHI  
RAJSHAHI-6205, BANGLADESH**

**DEPARTMENT OF POPULATION SCIENCE AND HUMAN RESOURCE DEVELOPMENT**  
**FACULTY OF SCIENCE**  
**UNIVERSITY OF RAJSHAHI**

## **Overview**

The Department of Population Science and Human Resource Development started in 1996 under the Faculty of Science, University of Rajshahi, Bangladesh. It began with two faculty members and seven supporting staff by enrolling twenty five students and gradually increased the capacity of enrollment of students. Now there are 60 students enrolled in each session with around 300 students in total including M. Phil. and Ph. D. level students. Twenty three faculty members with 14 office staff are currently conducting the academic activities.

The academic curriculum of the department is being offered in English medium since its inception. Given its importance, this Department introduced thirty courses in the B. Sc. Honours level and eight courses at M. Sc. level including Demography, Statistics, Mathematics, Economics, Econometrics, Computer Programming, Population Health, Human Resource Development (HRD) and Environmental Studies.

## **Vision and Mission Statement of the Department of Population Science and Human Resource Development**

Increasing population is the burning issue in the developing world. Developing countries like Bangladesh experience the negative impact of rapid, uncontrolled population growth, often requiring western countries to provide direct aid to avert famine. Poor social matters, including regional warfare and weak governance, often make conditions worse when scarce resources are not sufficient to meet the needs of a rapidly growing population. These conditions exacerbate poverty, malnutrition, childhood and maternal mortality, use of child labor and already inadequate educational opportunities, especially for women. British economist Thomas Malthus (1766-1834) sounded the first modern warning of the potentially negative impact of population growth on economic development. He argued that populations will always tend to increase past the natural levels of the food supply, and therefore public policy should encourage what he called "moral restraint" to limit the birthrate. Otherwise the per capita Gross Domestic Product (GDP), which is the measure of wealth per individual, will inevitably decline.

Taking all challenges of population issues into account, researchers are now engaged to project and estimate population growth and to develop the population control mechanism to face the upcoming socio-economic, demographic and environmental problems. Population growth directly affects the socio-economic development and environmental sustainability.

### **Vision**

The vision of the Department of Population Science and Human Resource Development is to make human/graduates as resource by providing necessary education, training and skills so that they can meet the needs of global settings.

### **Mission**

The mission of the Department is to generate quality graduates in each and every area of demography and human resource development by providing necessary knowledge of mathematics, statistics, economics, health, environment, and computer programming along with advanced research.

**B.Sc. Honours Syllabus under Faculty of Science Curriculum for Academic Year 2013-2014**

**Part – I Examination 2014**

**Part – II Examination 2015**

**Part – III Examination 2016**

**Part – IV Examination 2017**

The B.Sc. Honours Programme in Population Science and Human Resource Development shall be spread over four academic years. There shall be twenty-nine theoretical courses including eight related courses, a field study and report writing, and twenty-four practical sessions. There shall be a noncredit course of 50 marks on Functional English in the first year. A full-unit course shall carry 100 marks and a half-unit 50 marks. Total number of lectures on a full-unit course has to be 75 and that for a half-unit course would be 40. Duration of examination for the theoretical papers shall be 4 hours for a full-unit and 3 hours for a half-unit course. The minimum marks/grade points required for the promotions to the 2<sup>nd</sup> year, 3<sup>rd</sup> year and 4<sup>th</sup> year and for obtaining the B.Sc. (Honours) degree will be according to the ordinance adopted by the university.

**Grading System**

Numerical Grade	Letter Grade	Grade Point	CP/unit
80% or above	A+ (A Plus)	4.0	4
75% to less than 80%	A (A regular)	3.75	4
70% to less than 75%	A- (A minus)	3.5	4
65% to less than 70%	B+ (B Plus)	3.25	4
60% to less than 65%	B (B regular)	3.0	4
55% to less than 60%	B- (B minus)	2.75	4
50% to less than 55%	C+ (C Plus)	2.5	4
45% to less than 50%	C (C regular)	2.25	4
40% to less than 45%	D	2.0	4
Less than 40%	F	00	0

**Table of LG, GP and CP for non-credit courses**

30% and above	S	Satisfactory	0.0	0.0
Less than 30%	U	Unsatisfactory	0.0	0.0

N.B.:In the Transcript/Grade Sheet, only the Letter Grade and the Corresponding Grade Points, the CGPA, not the numerical marks, will be shown. In no case numerical score will be provided.

**The year-wise course units, marks and credit distributions are as follows:**

Honours Classes	:	I	II	III	IV	Total
Course units	:	9.5	9.5	10.5	10.5	40
Marks	:	950	950	1050	1050	4000
Credits	:	38	38	42	42	160

The B.Sc. Honours examination would be divided into four parts namely, B.Sc. Honours Part – I, B.Sc. Honours Part – II, B.Sc. Honours Part – III and B.Sc. Honours Part – IV.

The B.Sc. Honours, Part – I examination would be held at the end of first year consisting of seven theory papers of **100** marks each of four hours duration and six practical sessions of  $(25+25+25+25+25+25) = 150$  marks each of five hours duration and viva-voce examination of 50 marks. There would be a terminal or tutorial examination of **40** marks and **10** marks for class attendance during the session.

The B.Sc. Honours Part - II examination would be held at the end of second year consisting of seven theory papers of **100** marks each of four hours duration and six practical sessions of  $(25+25+25+25+25+25) = 150$  marks each of five hours duration and viva-voce examination of 50 marks. There would be a terminal or tutorial examination of **40** marks and **10** marks for class attendance during the session.

The B.Sc. Honours Part – III examination would be held at the end of third year consisting of eight theory papers of **100** marks each of four hours duration and six practical sessions of  $(25+25+25+25+25+25) = 150$  marks each of five hours duration and viva-voce examination of 50 marks. There would be a terminal or tutorial examination of **40** marks and **10** marks for class attendance during the session.

The B.Sc. Honours Part – IV examination would be held at the end of the fourth year consisting of seven theory papers of **100** marks each of four hours duration and six practical sessions of  $(25+25+25+25+25+25) = 150$  marks each of five hours duration and viva-voce examination of 50 marks. There would be a terminal or tutorial examination of **40** marks and **10** marks for class attendance and a project paper and field study of **100** marks during the year.

The result of a candidate would be determined on the basis of the combined results of the B.Sc. Honours Part – I, Part – II, Part – III and Part – IV examinations according to the ordinance of Science Faculty.

The following are the year-wise distribution of the courses:

### Honours Part – I (First Year)

Course No.	Course Title	Course Unit	Marks	Status	Credit
<b>B-PHR-100</b>	Functional English	0.5	50	Non-credit	00
<b>B-PHR-101</b>	Population and Demographic Data	1.0	100	Compulsory	4
<b>B-PHR-102</b>	Population Size, Distribution and Composition	1.0	100	Compulsory	4
<b>B-PHR-103</b>	Population Dynamics	1.0	100	Compulsory	4
<b>B-PHR-104</b>	Algebra, Trigonometry & Geometry	1.0	100	Compulsory	4
<b>B-PHR-105</b>	Calculus and Differential Equations	1.0	100	Compulsory	4
<b>B-PHR-106</b>	Introductory Statistics	1.0	100	Compulsory	4
<b>B-PHR-107</b>	Principles of Economics	1.0	100	Compulsory	4
<b>B-PHR-108</b>	Terminal, Tutorial, Class Attendance	0.5	50	Compulsory	2
<b>B-PHR-109</b>	Practical	1.5	150	Compulsory	6
<b>B-PHR-110</b>	Viva-voce	0.5	50	Compulsory	2
<b>Total</b>		<b>9.5</b>	<b>950</b>		<b>38</b>

### First Year Practical Courses

Course No.	Course Title	Marks	Credit
<b>B-PHR-109</b>	<b>Practical</b>	<b>150</b>	
<b>Session I</b>	Population and Demographic Data (A)	25	
<b>Session II</b>	Population and Demographic Data (B)	25	
<b>Session III</b>	Population Size, Distribution and Composition	25	<b>6</b>
<b>Session IV</b>	Population Dynamics	25	
<b>Session V</b>	Mathematics	25	
<b>Session VI</b>	Introductory Statistics	25	

### **Honours Part – II (Second Year)**

Course No.	Course Title	Course Unit	Marks	Credit
<b>B-PHR-201</b>	Marriage and Family	1.0	100	4
<b>B-PHR-202</b>	Life Table Analysis	1.0	100	4
<b>B-PHR-203</b>	Principles of Human Resource Development	1.0	100	4
<b>B-PHR-204</b>	Computer Programming and Packages	1.0	100	4
<b>B-PHR-205</b>	Matrices and Numerical Analysis	1.0	100	4
<b>B-PHR-206</b>	Theory of Statistics	1.0	100	4
<b>B-PHR-207</b>	Statistical Methods	1.0	100	4
<b>B-PHR-208</b>	Terminal, Tutorial, Class Attendance	0.5	50	2
<b>B-PHR-209</b>	Practical	1.5	150	6
<b>B-PHR-210</b>	Viva-voce	0.5	50	2
<b>Total</b>		<b>9.5</b>	<b>950</b>	<b>38</b>

### Second Year Practical Courses

Course No.	Course Title	Marks	Credit
<b>B-PHR-209</b>	<b>Practical</b>	<b>150</b>	
<b>Session I</b>	Marriage and Family	25	
<b>Session II</b>	Life Table Analysis	25	
<b>Session III</b>	Human Resource Development	25	<b>6</b>
<b>Session IV</b>	Computer Programming	25	
<b>Session V</b>	Theory of Statistics	25	
<b>Session VI</b>	Method of Statistics	25	

### **Honours Part – III (Third Year)**

Course No.	Course Title	Course Unit	Marks	Credit
<b>B-PHR-301</b>	Population Projection	1.0	100	4
<b>B-PHR-302</b>	Mortality Estimation	1.0	100	4
<b>B-PHR-303</b>	Methods of Human Resource Development	1.0	100	4
<b>B-PHR-304</b>	Population Genetics	1.0	100	4
<b>B-PHR-305</b>	Population Redistribution and Urbanization	1.0	100	4
<b>B-PHR-306</b>	Population, Health and Nutrition	1.0	100	4
<b>B-PHR-307</b>	Population, Resource and Environment	1.0	100	4
<b>B-PHR-308</b>	Labour Force and Manpower Planning	1.0	100	4
<b>B-PHR-309</b>	Terminal, Tutorial, Class Attendance	0.5	50	2
<b>B-PHR-310</b>	Practical	1.5	150	6
<b>B-PHR-311</b>	Viva-voce	0.5	50	2
<b>Total</b>		<b>10.5</b>	<b>1050</b>	<b>42</b>

### **Third Year Practical Courses**

Course No.	Course Title	Marks	Credit
<b>B-PHR-310</b>	<b>Practical</b>	<b>150</b>	
<b>Session I</b>	Population Projection	25	
<b>Session II</b>	Mortality Estimation	25	
<b>Session III</b>	Population Genetics	25	6
<b>Session IV</b>	Population Redistribution and Urbanization	25	
<b>Session V</b>	Population, Resource and Environment	25	
<b>Session VI</b>	Labor Force and Manpower Planning	25	

### **Honours Part – IV (Fourth Year)**

Course No.	Course Title	Course Unit	Marks	Credit
<b>B-PHR-401</b>	Fertility Estimation	1.0	100	4
<b>B-PHR-402</b>	Life Time Data Analysis	1.0	100	4
<b>B-PHR-403</b>	Mathematical Demography	1.0	100	4
<b>B-PHR-404</b>	Population Policies, Programs and Issues	1.0	100	4
<b>B-PHR-405</b>	Population Theory	1.0	100	4
<b>B-PHR-406</b>	Research Methodology	1.0	100	4
<b>B-PHR-407</b>	Human Resource Development Planning	1.0	100	4
<b>B-PHR-408</b>	Field Study and Report	1.0	100	4
<b>B-PHR-409</b>	Terminal, Tutorial, Class Attendance	0.5	50	2
<b>B-PHR-410</b>	Practical	1.5	150	6
<b>B-PHR-411</b>	Viva-voce	0.5	50	2
<b>Total</b>		<b>10.5</b>	<b>1050</b>	<b>42</b>

### Fourth Year Practical Courses

Course No.	Course Title	Marks	Credit
<b>B-PHR-410</b>	<b>Practical</b>	<b>150</b>	<b>6</b>
<b>Session I</b>	Fertility Estimation	25	
<b>Session II</b>	Life Time Data Analysis	25	
<b>Session III</b>	Mathematical Demography	25	
<b>Session IV</b>	HRD and Population Theory	25	
<b>Session V</b>	Population Policies, Programs and Issues	25	
<b>Session VI</b>	Research Methodology	25	

**Promotions:** In order to be eligible for promotion from one class to the next higher Honours class, a candidate must secure (i) at least 2.00 GPA in his/her Part-1, 2.25 GPA in Part-2 and 2.50 GPA in Part-3 examinations, (ii) at least 2.00 GP in each of his/her Part-I, Part-2 and Part-3 practical and class assessment/tutorial/terminal/home assignment course examinations, and (iii) 30 credits for each of Part-1 and Part-2 and 34 credits in Part-3 examinations.

**Course Improvement:** A promoted student earning a grade less than **2.75** in individual course shall be allowed to improve the grades on courses, not more than two full unit courses including those of “**F**” grades, if any, of **Part-I**, **Part-2**, and **Part-3** examinations or their equivalent courses (in case of changes in the syllabus), defined by the departmental academic committee, through the regular examination of the immediate following batch. However, if the candidate fails to clear his/her “**F**” grades in the first attempt, he/she shall get a second (last) chance in the immediate next year to clear the “**F**” grades. If a candidate fails to improve his/her course grade, the previous grade shall remain valid.

<b>Year:</b> First Year	<b>Code:</b> B-PHR-100	<b>Marks:</b> 50	<b>Credits:</b> Non-credit	<b>Duration:</b> One Year
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## Title: Functional English

### Aims of the Course

The aim of the course is to extend student's capability with necessary syntax rules of English language in order to handle the syllabus contents under the English medium of instruction.

### Objectives of the Course

After Completing this course, the students should have to

- Cover up the necessary syntax rules of sentence construction along with other rules of English grammar;
- develop skill to handle voice change, Narration and transformation of sentences;
- communicate and write reports in English.

### Learning Outcomes

By the end of this course, the students will have

- developed necessary skill to read and understand other course contents;
- been able to communicate and carry out different examinations and reports writing.

### Contents

Review of parts of speech; Articles; Basic sentence structures, Tense and its forms (conjugation); Punctuations; Structure of simple, compound and complex sentences; Narrations; Change of voice; Corrections.

Translations; Paragraph writing; Report writing on a small project.

**Delivery Modes:** Contact teaching.

**Course Materials:** Will be handed out at the lecture time.

**Assessment Methods:** Continuous assessment and formal examination.

### Essential Readings

- 📖 Thomson, A.J. and Martinet, A.V., (1986), *A Practical English Grammar*, 2<sup>nd</sup> edition, Oxford University Press.
- 📖 Swales, J.M., (1980), *Writing Scientific English: A Textbook of English as a Foreign Language for Students of Physical and Engineering Sciences*, Nelson.
- 📖 Hornby, A.S., (1978), *The Teaching of Structural Words and Sentence Patterns: Stages 1 and 2* published in one volume, Volumes 1-2, Oxford University Press.



<b>Year:</b> First Year	<b>Code:</b> B-PHR-101	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Population and Demographic Data</b>				

## Aims of the Course

This course introduces students to the understanding of introductory population study issues, more specifically, about the sources and collection of demographic data, detection and minimization of errors in demographic data, simple and basic essential measures for analyzing and understanding graduation of demographic data.

## Objectives of the Course

After Completing this course, the students should have to

- understand population and demographic variables;
- understand different types of rates and ratios useful for demographic studies;
- acquire the capability of finding the sources of demographic data and its errors and
- acquire introductory knowledge of smoothing demographic data.

## Learning Outcomes

A student who successfully completes the course will have

- understood the aims, scope, nature and importance of population studies;
- acquired knowledge about simple demographic measures, error minimizing and data smoothing techniques in demographic study that will improve their confidence conducting and understanding basic demographic research.

## Contents

**Basic Concepts of Population Studies:** Population studies and demography; Scope of demography; Population science and other disciplines; Population and demographic variables: birth, death, marriage, migration, Lexis diagram.

**Sources and Collection of Demographic Data:** Nature of demography; Primary and secondary sources; Population census; Survey method; Vital registration system; Other record systems; International sources; Non-traditional sources; Sources of other population statistics.

**Errors in Demographic Data:** Types and sources of error; Detection; Errors of coverage and content; Measurement of errors; Errors in age data; Causes of errors in age data; Errors in reporting causes of death; Errors in reporting of vital events. Digit preferences. Whipple's index, Myers' index, UN Secretariat index, Pro-rating of age data. El-Badry's correction for zero error.

**Graduation of Demographic Data:** The graduation of census data; Survey data on age distribution; Mathematical graduation; Graphic method; Carrier-Farrag method; Moving average method; Quadratic interpolation; Idea of interpolation; Smoothing of age data. Interpolation based on Karup-king formula; Spragues formula; Beers ordinary formula; Beers modified formula and Grabill's weighted moving average of Sprague co-efficient.

**Demographic Rates and Ratios:** Concept of rate; Ratio; Proportion and probability. Crude rates; Refined rates; Growth rates; Survival ratio; Standardization of rates and ratios; Adjustment of data-pro-rata.

**Delivery Modes:** Contact teaching.

**Course Materials:** Will be handed out at the lecture time.

### **Assessment Methods**

#### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population and demographic data. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### **Essential Readings**

The following textbooks (latest editions) are recommended:

#### **Introductory Books**

- 📖 Barclay, G.W., (1958), *Techniques of Population Analysis*, John Wiley & Sons Inc.
- 📖 Bhall, B.K., Desai, J.N. and Jhingan, M.L., (2012), *Demography*, Vrinda Publication (P) Ltd.
- 📖 Bogue, D.J., (1969), *Principles of Demography*, Wiley.
- 📖 Hinde, A., (1998), *Demographic Methods*, Arnold Publishers, London.
- 📖 Spiegelman, M., (1968), *Introduction to Demography*, Harvard University Press.

#### **Core Books**

- 📖 Bogue, D.J., Arriaga, E.E., Anderton, D.L. and Rumsey, G.W., (1993), *Readings in Population Research Methodology*, United Nations Population Fund, Social Development Center, Chicago, Vol. 1.
  - 📖 Swanson, D.A. and Siegel, J.S., (2004), *The Methods and Materials of Demography*, Elsevier Academic Press.
  - 📖 Saunders, J., (1988), *Basic Demographic Measures: A Practical Guide for Users*, University Press of America.
  - 📖 Donald T. Rowland, D.T., (2003), *Demographic Methods and concepts*, Oxford University Press.
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<b>Year:</b> First Year	<b>Code:</b> B-PHR-102	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Population Size, Distribution and Composition</b>				

## Aims of the Course

This course aims to introduce students to the study of human population with respect to size, composition, distribution and changes in the population occurring over time based on the socio-economic, geographic and ethical view points with the help of videos, practices, study guides and real world applications along with their impact on society and culture.

## Objectives of the Course

After completing this course, the students should have to

- know the population status according to family, community, nation, and the world;
- learn various rates and ratios of population growth under a constrained environment;
- explore various aspects of population growth models under discrete and continuous circumstances;
- provide knowledge and understanding of the prevailing situation of population distribution;
- provide necessary skills to evaluate the impact and consequence of population growth on society.

## Learning Outcomes

A student who successfully completes the course will have

- understood and used functional methods for estimating population size and determining the growth and distribution of population under national and/or global settings;
- developed skills to use population information in order to develop and revise plans.

## Contents

**Population Size:** Concept of total population, population size, population change, growth of population; Causes of rapid population growth; World population growth; Trend of world population, world population prospects, national and international practices, time reference, completeness of coverage, spatial measures and categorical measures.

**Population Distribution:** Concept of population distribution, administrative and political areas, statistical areas, national and international recommendations, population density, population distribution based on residence, population distribution based on geographical area, urban-rural distribution, spatial distribution, population by types of settlements. Methods of analysis, Center of population, concentration of population. Population distribution by the process of demographic factors, measures of residence, Characteristics and trends of population distribution.

**Population Composition:** Age and sex composition; Uses of data; Analysis of sex composition; Analysis of deficiencies in age data: Grouped data in population composition; Analysis of age composition: use of indexes, index of relative difference, index of dissimilarity; Population pyramid; Analysis of population pyramids; Analysis of age-sex structure by use of population models.

**Racial and Ethnic Composition:** Concept, race and ethnic groups; Ancestry versus

ethnicity; International race and ethnic classification and practices analysis and measures: segregation indexes; Country of birth and citizenship, language.

**Educational Characteristics:** Basic concepts; definitions, collection and sources of education data; Measures; educational input; Educational progression, educational output; Characteristics and trends in education; Uses, limitations and applications of education data, levels, trends and patterns of education in Bangladesh, Girls stipend programmes in education.

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**Delivery Modes:** Contact teaching.

**Course Materials:** Will be handed out at the lecture time.

### **Assessment Methods**

#### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population and demographic data. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### **Essential Readings**

The following textbooks (latest editions) are recommended:

- 📖 Barclay, G.W., (1958), *Techniques of Population Analysis*, John Wiley & Sons Inc.
  - 📖 Bogue, D.J., (1969), *Principles of Demography*, Wiley.
  - 📖 Bogue, D.J., Arriaga, E.E., Anderton, D.L. and Rumsey, G.W., (1993), *Readings in Population Research Methodology*, United Nations Population Fund, Social Development Center, Chicago, Vol. 1.
  - 📖 Caldwell, J.C., (1976), 'Toward a restatement of demographic transition theory', *Population and Development Review* (Population Council), Vol. 2 (3/4), pp.321–366.
  - 📖 Coale, A.J., (1972), *The Growth and Structure of Human Populations: A Mathematical Investigation*, Princeton University Press.
  - 📖 Swanson, D.A. and Siegel, J.S., (2004), *The Methods and Materials of Demography*, Elsevier Academic Press.
  - 📖 Shryock, H.S., Siegel, J.S. and Stockwell, E.G., (1976), *The Methods and Materials of Demography*, Academic Press.
  - 📖 Spiegelman, M., (1968), *Introduction to Demography*, Harvard University Press.
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<b>Year:</b> First Year	<b>Code:</b> B-PHR-103	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Population Dynamics</b>				

## Aims of the Course

This course aims to develop the understanding about demographic changes and nature of a population based on the vital statistics and their effects on social, political, economic and cultural life.

## Objectives of the Course

After Completing this course, the students should have to

- know the basic concepts and measures of population dynamics;
- learn various measures of demographic events based on vital information.

## Learning Outcomes

A student who successfully completes the course will have

- understood the components of population dynamics;
- understood the sources of fertility, mortality and migration data and influential factors of such data;
- understood contemporary research regarding population dynamics that will provide quality learning.

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## Contents

**Population Dynamics:** Basic concepts of population dynamics; components of population dynamics.

**Fertility:** Concept of fertility; fecundity; birth control; marriage control; parity; children ever born; fertility differentials.

**Measures of Fertility Based on Vital Statistics:** Crude birth rate; general fertility rates; specific fertility rates; total fertility rate; standardized rates; cumulative fertility rate; parity progression ratio; marital fertility rates; the legitimate fertility rate; illegitimacy rate; completed fertility rate.

**Measures of Reproduction:** Gross reproduction rate; net reproduction rate; replacement index; reproduction rates adjusted for age.

**Mortality:** Definition and concepts of life and death; sources of mortality data; quality of death statistics; factors important in the mortality analysis; measures based on death statistics; observed rate; crude death rates; monthly death rates; specific death rates and ratios; rates adjusted for population composition; rates adjusted to probability basis; measures based on pregnancy wastage; fetal mortality; pre-natal mortality.

**Migration:** Concept of migration; sources of migration data and limitations; pull and push factor of migration; different types of migration; measures of migration; factors important in the analysis of migration; impact of migration; determinant of internal and international migration; migration streams; migration selectivity by characteristics of migrants; migration and urbanization.

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**Delivery Modes:** Contact teaching.

**Course Materials:** Will be handed out at the lecture time.

## **Assessment Methods**

### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population and demographic data. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## **Essential Readings**

The following textbooks (latest editions) are recommended:

- 📖 Barclay, G.W., (1958), *Techniques of Population Analysis*, Wiley.
  - 📖 Bogue, D.J., Arriaga, E.E., Anderton, D.L. and Rumsey, G.W., (1993), *Readings in Population Research Methodology*, United Nations Population Fund, Social Development Center, Chicago, Vol. **2 & 3**.
  - 📖 Bougue, D.J., (1969), *Principles of Demography*, Wiley.
  - 📖 Coale, A.J. and Demeny, P., (1967), 'Regional Model Life Tables and Stable Populations', *Cambridge University Press and Institute and Faculty of Actuaries*, Vol. **93(1)**, pp. 152-154.
  - 📖 Coale. A.J. and Demeny, P., (1983), *Regional Model Life Tables and Stable Populations*, Academic Press, New York.
  - 📖 Cox, P.R., (1950), *Demography*, Cambridge University Press.
  - 📖 Hinde, A., (1998), *Demographic Methods*, Hodder Arnold Publication.
  - 📖 Keyfitz, N. and Caswell, H., (2005), *Applied Mathematical Demography (Statistics for Biology and Health)*, 3<sup>rd</sup> Edition, Springer.
  - 📖 Pressat, R., (1972), *Demographic Analysis: Methods Results Applications*, Aldine Atherton.
  - 📖 Shryock, H.S., Seigel, J.S. and Stockwell, E.G., (1976), *The Methods and Materials of Demography*, Academic Press.
  - 📖 Spiegelman, M., (1968), *Introduction to Demography*, Harvard University Press.
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<b>Year:</b> First Year	<b>Code:</b> B-PHR-104	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Algebra, Trigonometry &amp; Geometry</b>				

### Aims of the Course

The aims of this course are to gather more knowledge regarding to higher Algebra, Calculus and Geometry that are frequently employed especially in population modeling and in any branch of science.

### Objectives of the Course

After Completing this course, the students should have to

- understand the set theory, the theory of equations regarding solutions of cubic, biquadratic and higher degree polynomial equations and the concepts of determinants and inequalities.
- Learn different trigonometric functions and theorems those will help to summing up different series and hyperbolic functions.
- know properties and applications of lines, axes, co-ordinates, plane under two and three dimensional spaces.

### Learning Outcomes

A student who successfully completes the course will have

- captured the necessity and usefulness of different algebraic expressions, equations and models that will provide better research ability;
- described and demonstrated how trigonometry can be used to find the height of tall stuffs (building, tree, high hill or other high object) where one cannot stand directly on the highest part.
- described in broad terms how trigonometry might be used to find the distance between far-away stuffs such as the earth and the moon.

### Contents

**Algebra:** Algebra of sets, De Morgan's theorem, distributive laws, sets of numbers; Cartesian product; Inverse function; Relation; Determinant, properties of determinant and Cramer's rule; Theory of equations, relation between roots and coefficients, Descarte's rule of sign, solutions of cubic and biquadratic equations; Inequalities.

**Trigonometry:** Complex quantities; De Moivre's theorem; Deduction from De Moivre's theorem; Trigonometric functions of complex arguments; Euler's theorem, Euler's exponential values; Gregory's series; Summation of series; Hyperbolic function.

**Plane Co-Ordinate Geometry:** Co-ordinates; Polar co-ordinates; The straight line; Change of axes; Pairs of straight lines.

**Solid Geometry:** Rectangular co-ordinates; The plane; The straight line.

**Delivery Modes:** Contact teaching.

**Course Materials:** Will be handed out at the lecture time.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population and demographic data. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Barnard, S., (2007), *Higher Algebra*, DODO Press.
  - 📖 Cifarelli, V., Gloag, A., Greenberg, D., Sconyers, J. and Zahner, B., (2009), *CK-12 Geometry*, CK-12 Foundation.
  - 📖 Corral, M., (2009), *Trigonometry*, mecmath.net.
  - 📖 Landers, M. and Meery, B., (2009), *CK-12 Trigonometry*, CK-12 Foundation.
  - 📖 Lipschutz, S., (1964), *Schaum's Theory and Problems of Set Theory*, McGraw-Hill.
  - 📖 Rea, (2004), *The Algebra & Trigonometry Problem Solver*, Research & Education Association, New Jersey.
  - 📖 Sy, S., (2008), *Trigonometry Notes*, Michigan State University.
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<b>Year:</b> First Year	<b>Code:</b> B-PHR-105	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
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## Title: Calculus and Differential Equations

### Aims of the Course

The aim of this course is to provide a framework for modeling systems in which there are changes and the ways to figure out the predictions of such models. This course also aims to introduce the fundamental concepts, techniques and theories of differential equations and their applications, especially classical techniques for solving differential equations.

### Objectives of the Course

After Completing this course, the students should have to

- learn what do domain, range, limit, continuity and differentiability of a function mean along with the categories of functions;
- learn the maximization and minimization rules of functions;
- learn the concepts of definite integrals to solve problems involving area, volume, and other physical applications;
- learn to formulate, identify and solve differential equations using several methods under boundary conditions or initial conditions.

### Learning Outcomes

A student who successfully completes the course will have

- provided skill to construct relatively simple quantitative models of change and to outline their consequences.
- been able to apply the fundamental techniques of differential equations to perform the best analysis research.

### Contents

**Differential Calculus:** Functions; Graph of functions; Limit; Continuity and differentiability; Ordinary differentiation; Successive differentiation and Leibnitz's theorem; Expansions of functions; Rolle's theorem; Mean value theorem; Cauchy mean value theorem; Taylor's series and Maclaurin's series; Indeterminate form; L'hospital's theorem. maxima and minima of functions; Partial differentiation; Euler's theorem on homogeneous functions. Tangent and normal, asymptotes.

**Integral Calculus:** Indefinite integrals; Method of substitution; Integration by parts; Special trigonometric functions and rational fractions; Definite integrals; Fundamental theorem of integral calculus; General properties; Evaluation of definite integral and reduction formulas; Multiple integrals: Dirichlet's theorem; Liouville's extension of Dirichlet's theorem; Determination of lengths; areas and volumes.

**Differential Equations:** Ordinary differential equations; Formation of ordinary differential equation; Separation of variables; Homogeneous differential equation; Exact differential equation; linear differential equations; Bernoulli's differential equation; Homogeneous and non-homogenous differential equations; Method of undetermined coefficients; Operator method; Variation of parameters; Cauchy Euler equations.

**Delivery Modes:** Contact teaching.

**Course Materials:** Will be handed out at the lecture time.

### **Assessment Methods**

#### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of calculus and differential equation. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### **Essential Readings**

The following textbooks (latest editions) are recommended:

- 📖 Khuri, A.I., (2003), *Advanced Calculus with Applications in Statistics*, 2<sup>nd</sup> edition, John Wiley and Sons, Inc.
- 📖 Rea, (2004), *The Algebra & Trigonometry Problem Solver*, Research & Education Association, New Jersey.
- 📖 Ryan, M., (2010), *Calculus Essentials for Dummies*, Wiley Publishing, Inc.
- 📖 Tan, S.T., (2007), *Applied Calculus for Managerial, Life and Social Sciences*, 7<sup>th</sup> edition, Thomson.

### **Core Book**

- 📖 Stewart, J., (2008), *Calculus Early Transcendentals*, 7<sup>th</sup> edition, Brooks/Cole.
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<b>Year:</b> First Year	<b>Code:</b> B-PHR-106	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Introductory Statistics</b>				

## Aims of the Course

The aim of this course is to introduce students to the basic concepts and nature of statistical data and different statistical techniques applicable to present, interpret and analyse statistical data in different fields study.

## Objectives of the Course

After completing this course, the students should have to

- gain knowledge about the nature and sources of statistical data;
- learn statistical techniques and their applications in different fields and
- build up the capability regarding presentation, analysis and interpretation of data and results in different fields of research.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- understand the relevance of statistics in their different professional sectors;
- identify the sources and nature of statistical data;
- present, evaluate and adjust the necessary statistical data;
- select necessary statistical techniques and apply the basic univariate and bivariate statistical techniques to analysis data and interpret results.

## Contents

**Univariate Data Analysis:** Meaning and scope of Statistics; Collection and presentation of data; Frequency distribution and graphical representation; Stem and leaf diagram; Box plot; Location; Dispersion and their measures; Moments and cumulants. Skewness, Kurtosis and their measures.

**Probability:** Sample space; Events; Union and intersection of events; Probability of events; Additive and multiplicative laws of probability; Discrete and continuous random variables; Probability mass function; Probability density function and distribution function; Joint; marginal and conditional distribution; Mathematical expectation, variance, covariance and conditional expectations; Moment and cumulant generating functions.

**Parent Distributions:** Binomial, Poisson, Geometric, Normal, Gamma and Beta distributions.

**Bivariate Data Analysis:** Bivariate quantitative data; Scatter diagram. Correlation; Regression; Partial and multiple correlation; Rank correlation; Principle of least squares; Simple linear regression model, lines of best fit.

**Attributes:** Basic idea, variable and attributes, Association and disassociation; Measure of association; Association in contingency tables. 2x2, r x c contingency table for test of association, Fisher's exact test.

**Time Series Data:** Definitions; Component of time series; Decomposition of trend; Seasonal variation; Cyclical fluctuation; Irregular variation.

**Index Number:** Concept; Simple indices; Weighted indices; Ideal index number; Cost of living index number

**Delivery Modes:** Contact teaching.

**Course Materials:** Will be handed out at the lecture time.

### **Assessment Methods**

#### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of introductory statistics. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### **Essential Readings**

The following textbooks (latest editions) are recommended:

- 📖 Larson, R. and Farber, B., (2012), *Elementary Statistics Picturing the World*, 5<sup>th</sup> edition, Prentics Hall.
  - 📖 Mann, P.S., (2010), *Introductory Statistics*, 7<sup>th</sup> edition, John Wiley and Sons, Inc.
  - 📖 Mendenhall, W. III, Beaver, R.J. and Beaver, B.M., (2013), *Introduction to Probability and Statistics*, 14<sup>th</sup> edition, Brooks/ Cole.
  - 📖 Mood, A.M., Graybill, F.A. and Boss, D.C., (1974), *Introduction to the Theory of Statistics*, 3<sup>rd</sup> edition, McGraw-Hill.
  - 📖 Moore, D., McCabe, G.P. and Craig, B., (2012), *Introduction to the Practice of Statistics*, 7<sup>th</sup> edition, W.H. Freeman.
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<b>Year:</b> First Year	<b>Code:</b> B-PHR-107	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Principles of Economics</b>				

## Aims of the Course

The course is suitable for students with or without A Level economics or equivalent. It aims to cover the basic theories of microeconomics (the behaviour of individuals and firms) and macroeconomics (that of the economy as a whole). The key attempt is to develop a fundamental understanding about the consumer's economic behaviour; how consumers gain theoretical insights about the working of the economy and the effects of economic policy; and how economics theories and models used to derive testable, empirical predictions.

## Objectives of the Course

After completing this course, the students should have to

- provide basic knowledge and understanding of the implications of rational behaviour for the actions of the consumers.
- understand of the basic tools of consumer theory (utility functions, indifference curves, budget constraints etc.)
- provide the ability to undertake comparative static analysis and derive empirical predictions about consumer behaviour.
- understand how consumer theory works in models of labour supply.
- be skilled with the tools necessary to evaluate the impact of government policy (such as price controls, taxes, tariffs etc.) on consumers, producers and economic welfare.

## Learning Outcomes

A student who successfully completes the course will have

- understood the economic principles that underpin modern economics;
- a basic understanding of the way budget constrained individuals make optimizing choices and the way resources are allocated in private markets;
- understood the role of different trading arrangements in markets and their impact on prices and the quantities traded;
- used basic economic principles to evaluate the effects of government interventions and other exogenous changes in markets;
- evaluated the effects of government interventions in markets;
- been able to present clearly written analysis of economic issues and problems.

## Contents

**Nature and Scope of Economics:** Definition of economics; Goals of economics; scope of economic theory and basic economic problems; Methods of economics and its limitation; Concepts of micro and macro economics; Economic laws.

**Concepts of Consumer Behavior:** Utility; Marginal and total utility; Utility function; Demand function from utility function; Law of diminishing marginal utility; Law of equi-marginal utility; Indifference curve analysis – equilibrium of the consumer; Normal inferior; Giffen goods; Demand and supply of commodities; Market demand and market supply; Market equilibrium; Elasticity of demand and supply; Measurement of elasticities; Consumer surplus; Consumption function; Engel's law.

**Theory of Firm:** Theory of cost; Market Theory: Perfect competition and monopoly; Cost

of production, Equilibrium of a firm under perfect competition; Profit maximization.

**Production Function:** Production function; Returns to scale; Productivity curves; Isoquants; Law of variable proportions. Cobb-douglas production function and its properties; Constant Elasticity of substitution (CES) Production function and its properties.

**National Income:** Concepts of national income, GDP, GNP, Personal income; Disposal income, Measurement and determinant of national income, Public debt, Employment-unemployment and inflation.

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**Delivery Modes:** Contact teaching, Group Discussion.

## Course Materials

Copies of lecture presentations will be handed out at the lecture time and can be downloaded in any time from <http://www.popsru.org> with the permission of the course teacher. The soft copy of necessary recommended books will also be available in the course teacher's webpage. Permission will be required for downloading.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of principles of Economics. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be inof 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## Essential Readings

The following textbooks (latest editions) are recommended:

### Introductory Book

📖 Salvatore, D. and Diulio, E.A., (2003), *Principles of Economics*, Schaim's Outline Series, McGraw-Hill.

### Core Books

- 📖 Dewett, K.K., (1999), *Modern Economic Theory*, S. Chandra & Company Ltd.
- 📖 Hall, R.E. and Lieberman, M., (2001), *Economics: Principles and Applications*, Second Edition, South-Western.
- 📖 Koutsoyiannis, A., (1979), *Modern Microeconomics*, 2nd Edition, Macmillan Publishers Ltd.
- 📖 Mankiw, N. and M. Taylor (2010), *Principles of Microeconomics*, Third Edition, South-Western, Cengage Learning.
- 📖 Mankiw, N. and M. Taylor (2004), *Principles of Economics*, Third Edition, South-Western.

**Students may wish to work with an alternative introductory text. The alternatives I would recommend are**

- 📖 McDowell, M., Thon, R., Frank, R and Bernanke, B. (2009) *Principles of Economics*, 2nd Edition, McGraw Hill.
  - 📖 Sloman, J. and A. Wride (2009), *Economics*, 7th Edition, Prentice-Hall.
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## **B-PHR-109**

### **Practical**

(Full Marks=150; Total Time: 30 Hours)

#### **Session I (Population and Demographic Data(A))**

- (i) Grouping of age data;
- (ii) Percentage distribution of population;
- (iii) Estimation of total and mid-year population;
- (iv) Calculation of growth rate by various formula;
- (v) Calculation of time required for population double;
- (vi) Calculation of rates, ratios, proportions and probabilities.

#### **Session II (Population and Demographic Data (B))**

- (i) Evaluation of age data for digital preferences- Whipple's Index, Myer's Index
- (ii) Adjustment of data by pro-rating;
- (iii) Graduation of demographic data- Carrier-Farrag method, Moving average method, Quadratic interpolation and Graphic method;
- (iv) Smoothing of age data – Karup-king formula; Sprague formula; Beers ordinary formula; Beers modified formula and Grabill's weighted moving average of Sprague co-efficient;
- (v) Calculation of refined rates, adjusted rates and standardized rates.

#### **Session III (Population Size, Distribution and Composition)**

- (i) Distribution of population by age and sex;
- (ii) Distribution of population by ethnic composition and by residence;
- (iii) Calculation of center of population;
- (iv) Spatial measures of population;
- (v) Evaluation of preference indexes for terminal digits- Myer's index, Whipple's index;
- (vi) Calculation of the Error of closure;
- (vii) Evaluation of the Age-Sex Accuracy Index;
- (viii) Computation of different measures of educational input, output and progression.

#### **Session IV (Population Dynamics)**

- (i) Calculation of different types of fertility rates;
- (ii) Calculation of different types of reproduction rates;
- (iii) Calculation of different types of mortality rates;
- (iv) Calculation of different types of migration rates.

#### **Session V (Mathematics)**

- (i) Function, domain and range of functions in cartesian coordinates, (trigonometric, polynomial, exponential, logarithmic and absolute value functions). Testing the continuity and differentiability of a function only by the observation of the graphs, matrix operation;
- (ii) Maximum and minimum and graphs of functions of one variable;
- (iii) Solution of the system of linear equations by Matrix methods and Jordan method.

## **Session VI (Introductory Statistics)**

- (i) Graphical representation of statistical data;
- (ii) Preparation of frequency distribution table and graphical representation
- (iii) Computation of various measures of central tendency from ungrouped and grouped data;
- (iv) Computation of various measures of dispersion from ungrouped and grouped data;
- (v) Computation of moments, skewness and kurtosis;
- (vi) Probability distributions;
- (vii) Correlation and association and its difference in practice;
- (viii) Regression of two variables;
- (ix) Time series: Measures of trend, moving average and semi moving average;
- (x) Index number.



Year:	Code:	Marks:	Credits:	Duration:
Second Year	B-PHR-201	100	04	One Year
<b>Title: Marriage and Family</b>				

### Aims of the Course

This course offers students the opportunity to engage in the critical analyses of marriage and family to help them becoming more aware of how their lives are shaped by social forces and how appreciate the ability to interact with the world in a constructive manner.

### Objectives of the Course

After completing this course, the students should have to

- understand the concept of marriage and family;
- understand the effect of marriage and family on population growth;
- understand the family structure, and its function and dynamics.

### Learning Outcomes

A student who successfully completes the course will have

- understanding on the basic events regarding marriage and family those are influential to determine the socio-economical structure of household and society;
- knowledge on different measures of family and marriage for better planning that will help stabilise the society and culture.

### Contents

**Marriage and its Dissolution:** Definition of marriage; marriage characteristics; marriage trends; types of marriage; divorce; dissolution; types of marital dissolution; causes of divorce; marital status and their interrelationships; measures - crude marriage rate; general marriage rate; age-sex specific rates; order-specific rates; standardized rates; proportion of single persons; total marriage rate; age at marriage and remarriage; mean age at marriage; singulate mean age at marriage; mean age at consummation, mean age at cohabitation; proportion ever married; marital stability; an exchange theory of marital stability; advantages and disadvantages of an exchange theory; four case of marital stability; exchange and control in marital life; patterns and differential; widowhood; orphan- hood; separation, annulment and their characteristics; teenage marriage; group marriage. Nuptiality tables; construction of gross and net nuptiality tables. Dissolution tables.

**Family:** Concept of family; sub-family; broken family; primary and secondary family; types of family, functions of family, family group; composition of family; relationship to head of the family; size of the family; ideal size of family; characteristics of the family; dynamics of family; life cycle of the family; family structure; Household; household size and types; Families in developed and developing countries.

**Delivery Modes:** Contact teaching.

### Course Materials

Copies of lecture presentations will be handed out at the lecture time. The soft copies of necessary recommended books will also be available and can be downloaded in any time from <http://www.popsru.org> with the permission of the authority.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of marriage and family. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### Essential Readings

The following textbooks (latest editions) are recommended:

#### Introductory Books

- 📖 Barclay, G.W., (1958), *Techniques of Population Analysis*, Wiley.
- 📖 Cox, P.R., (1950), *Demography*, Cambridge University Press.
- 📖 Dyer, E.D., (1983), *Courtship, Marriage, and Family--American Style*, Dorsey Press.
- 📖 Lee, A. M. and Lee, E. B., (1961), *Marriage and Family*, Barnes & Noble, New York.
- 📖 Nye, F. I., (1982), *Family Relationships: Rewards and Costs*, Saga Publications.
- 📖 Shryock, H.S., Seigel, J.S. and Stockwell, E.G., (1976), *The Methods and Materials of Demography*, Academic Press.
- 📖 Spiegelman, M., (1968), *Introduction to Demography*, Harvard University Press.

#### Core Books

- 📖 Bogue, D.J., Arriaga, E.E., Anderton, D.L. and Rumsey, G.W., (1993), *Readings in Population Research Methodology*, United Nations Population Fund, Social Development Center, Chicago, Vol. 4 & 7.
  - 📖 Skolnick, A.S. and Skolnick, J.H., (2009), *Family in Transition*, Pearson.
  - 📖 Strong, B., DeVault, C. and Cohen, T.F., (2008), *The Marriage and Family Experience*, 10<sup>th</sup> Edition, Thomson.
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<b>Year:</b> Second Year	<b>Code:</b> B-PHR-202	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Life Table Analysis</b>				

## Aims of the Course

The aim of this course is to introduce students to the concept of life table and the systematic study of survival, mortality and life expectancy pattern of a pre-specified population through different direct and indirect approaches.

## Objectives of the Course

After completing this course, the students should have to

- recognise different applications of life tables and understand their utility as a form of survival analysis;
- understand different basic functions for the construction of life tables;
- be able to use different indirect techniques for construction of life table when necessary informations are missing.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- construct life table that will improve the future national and global policy making strategies;
- understand the life expectancy and survival pattern by observing life tables and able to formulate policy and planning of any organizations that deal with socio-economic and welfare events of any population effety accomplish the actuarial tasks related to life insurance businesses.

## Contents

**The Life Table:** Cohort, radix, life span and life expectancy; central death rates; history of life table analysis; Definition of life table; Assumptions of life tables; Different types of life tables; Construction of conventional life tables; Complete life tables; Abridged life tables; Current life tables; Generation life tables; Life table functions and their interrelationships; Construction of complete life tables using various methods; Short cut methods of constructing abridged life table; The Reed-Merrell method, Greville's method, the Keyfitz-Frauenthal method, King's method, method of reference to a standard table, statistical analysis of life tables, life table survival function, calculation of life table survival rates, uses of life tables; Applications of life tables in population studies; Rates based on life tables, model life table.

**Model Life Tables:** Concept of model life table, UN model life tables, Coale and Demeny model life tables, Ledermann's system of model life tables, Brass logit life tables systems, UN model life tables for developing countries, Construction of the new UN model life table system.

**Decrement Analysis:** Concept, life table functions; Multiple and single decrement tables; Increment-decrement life tables; Joint life functions; Iterative life tables; Multiple decrement life table; Construction of multi-state life tables; Working life table; School life table; Nuptiality table.

**Force of Mortality:** Definition; derivation; Interrelationship between force of mortality and life table functions; Numerical evaluation of the force of mortality.

**Delivery Modes:** Contact teaching.

## Course Materials

Copies of lecture presentations will be handed out at the lecture time.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of life table analysis. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Barclay, G.W., (1958), *Techniques of Population Analysis*, Wiley.
  - 📖 Bogue, D.J., Arriaga, E.E., Anderton, D.L. and Rumsey, G.W., (1993), *Readings in Population Research Methodology*, United Nations Population Fund, Social Development Center, Chicago, Vol. 1, 2 & 3.
  - 📖 Bougue, D.J., (1969), *Principles of Demography*, Wiley.
  - 📖 Coale, A.J. and Demeny, P., (1967), 'Regional Model Life Tables and Stable Populations', *Cambridge University Press and Institute and Faculty of Actuaries*, Vol. 93(1), pp. 152-154.
  - 📖 Coale, A.J. and Demeny, P., (1983), *Regional Model Life Tables and Stable Populations*, Academic Press, New York.
  - 📖 Cox, P.R., (1950), *Demography*, Cambridge University Press.
  - 📖 Hinde, A., (1998), *Demographic Methods*, Hodder Arnold Publication.
  - 📖 Keyfitz, N. and Caswell, H., (2005), *Applied Mathematical Demography (Statistics for Biology and Health)*, 3<sup>rd</sup> Edition, Springer.
  - 📖 Pressat, R., (1972), *Demographic Analysis: Methods Results Applications*, Aldine Atherton.
  - 📖 Shryock, H.S., Seigel, J.S. and Stockwell, E.G., (1976), *The Methods and Materials of Demography*, Academic Press.
  - 📖 Spiegelman, M., (1968), *Introduction to Demography*, Harvard University Press.
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Year:	Code:	Marks:	Credits:	Duration:
Second Year	B-PHR-203	100	04	One Year
<b>Title: Principles of Human Resource Development</b>				

## Aims of the Course

This course intends to shed light on human capital, human development and human resources. The aim of this course is to equip the students with sufficient skills and knowledge for their career development in human resource department at organizational level.

## Objectives of the Course

After completing this course, the students should have to

- develop intellectual skills and knowledge on both qualitative and quantitative human resource development;
- provide mathematical knowledge and basis of human development;
- cover up the concepts, theory and practice of HRD at organizational, national and global level;
- develop the knowledge of interpersonal skill, teamwork, team spirit and leadership skills which are very important in organizations.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- intellectually operate human resource department at organization;
- communicate and handle contemporary human resource issues and programmes;
- perform SWOT analysis for individual and organizational development.

## Contents

**Human Capital Formation:** Concept of capital, capital formation (CF), material and human capital (HC), importance of capital formation, sources of capital formation, reasons for low rate of capital formation, meaning and importance of human capital formation (HCF), problem of HCF, criteria for investment in HC, population and CF.

**Human Development (HD):** Concept and basis of human development; historical perspectives of human development; human development paradigm, Sustainable human development, human development strategies in South Asia, human rights and human development, human rights education, human rights key measures, gender equity and equality, gender empowerment, gender inequality in HD, UNDP human development index (HDI), use of HDI for policy analysis, critiques of HDI, human poverty index (HPI), gender-related development index (GDI), gender empowerment index (GEI).

**Human Resource Development (HRD):** Meaning of human resources and HRD, human element; purpose, objectives and importance of HRD, Indicators of HRD, process and mechanism of HRD, multidisciplinary concept of HRD, macro and micro concept of HRD, HRD system and subsystem, HRD conceptual framework, life cycle approach of HRD, role of education in HRD, HRD and environment, SWOT analysis in HRD, future of software market and its implications for HRD.

**Human Resource Information System (HRIS):** Concept, importance and objectives of HRIS, Data of HRIS, job information, job families, competence, organizing HRD department, organizing HRD function, line and staff function, formal organization structure, placement, induction, promotion, succession and career development, education and training of human resources for modern high-tech industries.

**Delivery Modes:** Contact teaching.

### **Course Materials**

Copies of lecture presentations will be handed out at the lecture time.

### **Assessment Methods**

#### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of principles of human resource development. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### **Essential Readings**

The following textbooks (latest editions) are recommended:

- 📖 Beardwell, I., Holden, L. and Claydon, T., (2004), *Human Resource Management a contemporary Approach*, 4<sup>th</sup> edition, Prentice Hall.
  - 📖 Bhatia, B.S., Verma, H.L. and Garg, M.C., (2002), *Studies in Human Resource Development*, Deep & Deep Publications.
  - 📖 Decenzo, D.A. and Robbins, S.P., (1988), *Personnel/Human Resource Managemant*, 3rd edition, Prentice Hall College Div.
  - 📖 Desai, A.S., (1979), *Human Capital Formation and its Utilization*, Sterling Publishers Pvt. Ltd., New Delhi.
  - 📖 Dessler, G. and Varkkey, B., (2009), *Human Resource Management*, 11<sup>th</sup> edition, Dorling Kindersley (India) Pvt. LTD.
  - 📖 Fukuda-Parr, S., Kumar, A.K.S. and Sen, A., (2005), *Readings in Human Resource Development: Concepts, Measures and Policies for a Development Paradigm*, Oxford University Press.
  - 📖 Gould, W.T.S., (2009), *Population and Development*, Routledge.
  - 📖 Holton, E.F. III, and Torraco, R.J., (2002), *Human Resource Development Review*, Sage Publications.
  - 📖 Jhingan, K.L., (2011), *The Economics of Development and Planning*, 40<sup>th</sup> edition, Vrinda Publications.
  - 📖 Yadav, K.P., (2006), *Manpower Planning and Economics Development*, Sarup & Sons.
  - 📖 United Nations Development Prpgramme (UNDP), *Human Development Reports*, Series: 1990-2013, Communications Development Incorporated, Washington DC.
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Year:	Code:	Marks:	Credits:	Duration:
Second Year	B-PHR-204	100	04	One Year
<b>Title: Computer Programming and Packages</b>				

## Aims of the Course

The aims of this course are to provide a solid introduction to programming in C, R and OxMetrics and to provide an overview of the principles and constraints that affect the way in which the C, R and OxMetrics programming languages have been designed and used.

## Objectives of the Course

After completing this course, the students should have to

- be able to read and write C, C++, R and OxMetrics programs;
- understand the interaction between C, C++, R and OxMetrics programs and the host operating system;
- be familiar with the structure of C, C++, R and OxMetrics program execution in machine memory;
- understand the object-oriented paradigm presented by C++;
- understand the potential dangers of writing programs in C, C++, R and OxMetrics programs.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- understand the basic terminology used in computer programming
- write, compile and debug programs in C language.
- use different data types in a computer program.
- design programs involving decision structures, loops and functions.
- explain the difference between call by value and call by reference
- understand the dynamics of memory by the use of pointers.
- use different data structures and create/update basic data files.

## Contents

**Computer Fundamentals:** Kinds of computer and their functions; Components of computer; Hardware and software; System software; Operating systems.

**Programming in C:** Overview of C; Variables; Constants and data types; Operators and expression; Managing input and output operators; Decision making and branching; Looping; Arrays; User-defined functions; Structures and Unions; Pointers; File management in C; Dynamic memory allocation and linked lists; The preprocessor; developing a C program: some guideline.

## Packages

**R:** Overview and history; Simple manipulations: numbers, vectors, arrays and matrices; Getting data into R; Graphical procedures; Summarizing data; Probability distributions and simulation; Statistical Models in R: Regression analysis, ANOVA Chi-square and other tests.

**OxMetrics:** Ox Environment; Syntax; Operators; Input and output; Formats; Program flow and program design; Graphics; Using Ox classes: Regression and Simulation examples.

**Delivery Modes:** Contact teaching, Practical and Group work for Problem Solving.

## **Course Materials**

Copies of lecture presentations will be handed out at the lecture time and can be downloaded in any time from <http://www.popsru.org> with the permission of the course teacher. The soft copy of necessary recommended books will also be available in the course teacher's webpage. Permission will be required for downloading.

## **Assessment Methods**

### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of computer programming and packages. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## **Essential Readings**

The following textbooks (latest editions) are recommended:

### **Introductory Book**

📖 Gottfried, B.S., (1996), *Theory and Problems of Programming with C*, Schaim's Outline Series, McGraw-Hill. Second Edition.

### **Core Books**

📖 Balagurusamy, E., (2011), *Programming in ANSI C*, Tata McGraw-Hill. Fifth Edition.

📖 Doornik, J.A. and Ooms, M., (2006), *Introduction to Ox*.

📖 Sinha, P.K. and Sinha, P., (2004), *Computer Fundamentals*, BPB Publications. Sixth Edition.

📖 Owen, W.J. (2010), *The R Guide*, Department of Mathematics and Computer Science, University of Richmond.

📖 Venables, W.N., Smith, D.M. and R Development Core Team, (2013), *An Introduction to R*, Network Theory.

### **Students may wish to work with an alternative introductory text. The alternatives I would recommend are**

📖 French, C.S., (1996), *Computer Science*, Thomson Learning. Fifth Edition.

📖 Kernighan, B.W. and Ritchie, D.M. (1988), *The C Programming Language*, Prentice Hall Software Series. Second Edition.

📖 Kumar, R. and Agarwal, R., (1991), *Programming in ANSI C*, Thomson Learning.

📖 Venugopal K.R., (2007), *Mastering C*, Tata McGraw-Hill.

📖 Warford, J.S., (2010), *Computer Systems*, Jones and Bartlett Publishers. Fourth Edition.

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Year:	Code:	Marks:	Credits:	Duration:
Second Year	B-PHR-205	100	04	One Year
<b>Title: Matrices and Numerical Analysis</b>				

## Aims of the Course

The aims of this course are to provide basic concept of Vector, various forms of Matrices and Numerical Analysis along with the computational approach and applications to population modeling and inference.

## Objectives of the Course

After completing this course, the students should have to

- understand vector, vector space, various forms of matrices;
- solve various types of system of linear equations and Characteristics equations with the help of Matrices;
- know various types of estimates from the given data using numerical techniques.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- identify the applications of vector, vector space, various forms of matrices;
- easily make inference of existing population models and
- handle numerical techniques, if needed, to improve the problem solving ability.

## Contents

**Vector:** Vector addition; Dot and cross product; Gradient, divergence and curl, vector differentiation and integration.

**Vector Space:** Operation; group for addition and multiplication; field; vector addition and scalar multiplication, linear independence and dependence; vector spaces and sub-spaces; generator, basis and dimension.

**Matrices:** Basic operation; some special types of matrices and their properties; trace of matrices; determinants and their properties; elementary transformation; rank of matrices and their properties; inverse of matrices; inverse by partitioning; block matrices and their multiplication; solution of systems of linear equations; characteristics equations-latent roots and vector.

**Numerical Analysis:** Difference of a polynomial; finite difference operator; difference equations; Newton's forward and backward interpolation formula; central difference formula; gauss; Stirling's and Bessel's interpolation formulas; interpolation with unequal interval of the argument; inverse interpolation; numerical differentiation; numerical integration by different formula.

**Delivery Modes:** Contact teaching.

## Course Materials

Copies of lecture presentations will be handed out at the lecture time and can be downloaded in any time from <http://www.popsru.org> with the permission of the course teacher. The soft copy of necessary recommended books will also be available in the course teacher's webpage. Permission will be required for downloading.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of matrices and numerical analysis. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Ayres, F., (1983), *Theory and Problems of Matrices*, McGraw-Hill.
  - 📖 Bellman, R., (1997), *Introduction to Matrix Analysis*, 2<sup>nd</sup> Edition, SIAM.
  - 📖 Graybill, F.A., (2001), *Matrices with Application in Statistics*, 2<sup>nd</sup> Edition, Duxbury Classic Series, Brooks/Cole.
  - 📖 Gentle, J.E., (2007), *Matrix Algebra Theory, Computations, and Applications in Statistics*, Springer.
  - 📖 Hildebrand, F.B., (1987), *Introduction to Numerical Analysis*, 2<sup>nd</sup> edition, Dover Publications.
  - 📖 Lipschutz, S., and Lipson, M., (2001), *Schaum's Outline of Theory and Problems of Linear Algebra*, 3<sup>rd</sup> edition, Tata McGraw-Hill.
  - 📖 Lipschutz, S., and Lipson, M., (2004), *Schaum's Outline of Linear Algebra*, 3<sup>rd</sup> edition, McGraw-Hill.
  - 📖 Searle, S.R., (1982), *Matrix Algebra Useful for Statistics*, John Wiley & Sons, Inc., New York.
  - 📖 Burden, R. and Faires, J., (2010), *Numerical Analysis*, 9<sup>th</sup> edition, Cengage Learning.
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<b>Year:</b> Second Year	<b>Code:</b> B-PHR-206	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Theory of Statistics</b>				

## Aims of the Course

The aim of this course is to build up student's sound knowledge and skills regarding inferential statistics and the sampling distributions required for population, demographic and other modern research.

## Objectives of the Course

After completing this course, the students should have to

- acquire sufficient knowledge regarding sampling distribution;
- achieve knowledge and understanding about statistical inference;
- cover up statistical techniques at a level which is sufficient for a Population Science and HRD graduate with the capability of applications at required field of research.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- develop the statistical tools for empirical research;
- formulate hypotheses and test procedure of a research and finally;
- develop critical insights of other research.

## Contents

**Sampling Distributions:** Distribution of sample statistics; Study of chi-square,  $F$  and  $t$  distribution and their properties, uses and applications.

**Order Statistics:** Basic idea of order statistics; Distribution of order statistics: Joint and marginal; Distribution of smallest and largest order statistics.

**Point Estimation:** Concepts of estimation; Estimator and estimate; Characteristics of estimators: Unbiasedness; consistency; efficiency and sufficiency; Methods of point estimation: Method of moment, OLS, ML and Bayesian method.

**Interval Estimation:** Concepts; Methods of interval estimation: Statistical methods, large sample method, pivotal quantity method and Bayes method; Properties of C.I.

**Test of Significance:** Test of significance; Size and power of the test; BCR; CR; Power function; Power curve; Comparison of two sample means, proportions and variances; Test for homogeneity of means and variances; Test for correlation and regression coefficients; Non parametric tests; one sample and two sample tests; Test for randomness.

**Delivery Modes:** Contact teaching.

## Course Materials

Copies of lecture presentations will be handed out at the lecture time and can be downloaded in any time from <http://www.popsru.org> with the permission of the course teacher. The soft copy of necessary recommended books will also be available in the course teacher's webpage. Permission will be required for downloading.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of theory of statistics. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Cox, D.R., (2006), Principles of Statistical Inference, Cambridge University Press.
  - 📖 Hogg, R.V., McKean, J.W. and Craig, A.T., (2012), Introduction to Mathematical Statistics, 7<sup>th</sup> edition, Prentice Hall.
  - 📖 Mood, A.M., Graybill, F.A. and Boss, D.C., (1974), Introduction to the Theory of Statistics, 3<sup>rd</sup> edition, McGraw-Hill.
  - 📖 Moore, D., McCabe, G.P. and Craig, B., (2012), *Introduction to the Practice of Statistics*, 7<sup>th</sup> edition, W.H. Freeman.
  - 📖 Utts, J.M. and Heckard, R.F., (2007), Mind on Statistics, 3<sup>rd</sup> edition, Thomson, Brooks/Cole.
  - 📖 Weiss, N.A., (2008), Elementary Statistics, 7<sup>th</sup> edition, Greg Tobin.
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<b>Year:</b> Second Year	<b>Code:</b> B-PHR-207	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Statistical Methods</b>				

## Aims of the Course

The aim of this course is to provide a solid foundation of regression analysis (introductory and advanced), classifications, experimental design analysis and sampling techniques.

## Objectives of the Course

After completing this course, the students should have to

- well equip with regression analysis;
- develop the capability of model building strategies;
- learn formulation and applications of experimental design;
- develop significantly higher ability to design different sampling techniques and data collection procedures with maximum precisions;
- achieve higher ability to assess the efficiency of sampling design.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- understand all the features of regression analysis;
- apply and fit necessary regression models according to the nature of data;
- critically analyze results obtained from any regression analysis;
- apply different experimental designs with maximum precision and figure out the effects of different treatments used in those designs;
- develop different sampling designs according to the requirement of problems to be analyzed and compare the efficiency among sampling techniques.

## Contents

**Regression Analysis:** Review of simple linear regression; multiple linear regression models; Estimation of parameters by OLS method; Properties of OLS estimators; Generalized Least Square method and its property; Analysis of variance in the general linear models; Polynomial regression models and orthogonal polynomials.

**Experimental Design:** Concept of randomization; Replication; local control; Treatments and experimental units; Completely randomized; Randomized block and Latin square designs.

**Sample Survey:** Sample survey preliminaries; Probability and non-probability sampling; Sampling and non-sampling errors; Random sampling with and without replacement; procedures of selecting random sample; Study of simple random; Stratified; Systematic and equal size cluster sampling.

**Delivery Modes:** Contact teaching.

## Course Materials

Copies of lecture presentations will be handed out at the lecture time and can be downloaded in any time from <http://www.popsru.org> with the permission of the course teacher. The soft copy of necessary recommended books will also be available in the course teacher's webpage. Permission will be required for downloading.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of statistical methods. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Cochran, W.G., (1977), *Sampling Techniques*, 3rd ed., John Wiley & Sons, Inc.
  - 📖 Gurarati, D.N., (2007), *Basic Econometrics*, 4<sup>th</sup> edition, Tata McGraw-Hill Education.
  - 📖 Johnston, J., (1984), *Econometric Methods*, 3<sup>rd</sup> edition, McGraw-Hill.
  - 📖 Kowalski, S.M. and Montgomery, D.C., (2011), *Design and Analysis of Experiments, Minitab manual*, John Wiley & Sons.
  - 📖 Kabe, D.G. and Gupta, A.K., (2007), *Experimental Designs: Exercises and Solutions*, Springer.
  - 📖 Hinkelmann, K. and Kempthorne, O., (2008), *Design and Analysis of Experiments*, 2<sup>nd</sup> edition, John Wiley and Sons, Inc.
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**B-PHR-209**  
**Practical**  
**Marks=150; Total Time: 30 Hours**

**Session I (Marriage and Family)**

- (i) Percentage distribution by marital status;
- (ii) Calculation of different types of marriage and divorce rates;
- (iii) Calculation of singulate mean age at marriage;
- (iv) Construction of gross and net nuptiality tables;
- (v) Study of family structure.

**Session II (Life Table Analysis)**

- (i) Computation of Single Decrement Table;
- (ii) Computation of School Life Table;
- (iii) Computation of Nuptiality Table;
- (iv) Computation of Working Life Table.

**Session III (Human Resource Development)**

- (i) Computation of Composite Index;
- (ii) Statistical analysis of HRD;
- (iii) Computation of Human Development Index (HID).

**Session IV (Computer Programming)**

**Programming C**

- (i) Calculation of mean, variance, skewness and kurtosis;
- (ii) Regression and correlation analysis;
- (iii) Different estimation from different functions;
- (iv) Use of different short-cut methods for calculation of different mathematical functions;
- (v) Solution of equations;
- (vi) Calculation of probabilities;

**R Programming**

- (i) Regression analysis in R;
- (ii) Different test procedures in R.

**OxMetrics**

- (i) Matrix Operation in OxMetrics.
- (ii) Regression analysis in OxMetrics.

**Session V (Theory of Statistics)**

- (i) Calculation of point and interval estimation;
- (ii) Test of significance of single mean, two mean, proportion and variances;
- (iii) Calculation of size of test, power of test, BCR, homogeneity of mean and variances, non-parametric test, correlation test, regression coefficient test.

**Session VI (Statistics and Method)**

- (i) Fitting of Multiple Linear Regression Model by OLS method;
- (ii) Fitting of Polynomial and Orthogonal Polynomial Regression Model;
- (iii) ANOVA, CRD, RBD, LSD;
- (iv) SRS, Stratified sampling, cluster sampling.

<b>Year:</b> Third Year	<b>Code:</b> B-PHR-301	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Population Projection</b>				

## Aims of the Course

The aims of this course are to provide basic concept of population projection and estimation as a part of fundamental demographic analysis to conduct predictions or forecasts the future size and structure of the population in response to the needs of a certain users from a wide range of socio-economic and population related sectors with the help of existing tools and techniques including practical application of real data from Bangladesh, developing and developed world.

## Objectives of the Course

After completing this course, the students should have to

- be equipped with a wide range of simple and complex estimation and projection methods;
- understand different demographic trends that determine projected population change as well as the possible social, economic and environmental impacts;
- learn inherent uncertainty and limitations of population projection and estimation.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- apply population projection and estimation methods for making national and international policies;
- make critical assessment and judgment of different methods of population projection and estimation that will improve policy making strategies.

## Contents

**Population Estimates:** General considerations; Nature and use of population estimates; Type of population estimates; Intercensal estimates; Postcensal estimates; Conjectural estimates; National & international programs of population estimates. Some estimating principles; National estimates; Total population; Component method; Use of national sample and registrations; Estimates based on extremely limited data; Assumed rates of growth; Age-sex composition; Cohort-component method; Mathematical methods; The forward & reverse survival procedure. Censal-ratio and ratio-correlation method; Composite method; Evaluation of population estimates; Demographic estimates.

**Population Projections:** The nature and use of population projections; Types of population projections; The framework of assumptions and combination of assumptions; Length of projection period; National projections of total population and age-sex composition; Mathematical methods; Component methods; Time and method; Period-fertility method; Cohort-fertility method; Sub-national projection of total population and age-sex composition; Mathematical and ratio methods; Cohort-component method; Evaluation of projections.

**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.



## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population projection. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Barclay, G.W., (1958), *Techniques of Population Analysis*, John Wiley & Sons Inc.
  - 📖 Bogue, D.J., (1969), *Principles of Demography*, Wiley.
  - 📖 Bogue, D.J., Arriaga, E.E., Anderton, D.L. and Rumsey, G.W., (1993), *Readings in Population Research Methodology*, United Nations Population Fund, Social Development Center, Chicago, Vol. **1-8**.
  - 📖 Carrier, N., (1971), *Demographic estimation for developing societies: A manual of techniques for the detection and reduction of errors in demographic data*, London School of Economics, Population Investigation Committee.
  - 📖 Shryock, H.S., Seigel, J.S. and Stockwell, E.G., (1976), *The Methods and Materials of Demography*, Academic Press.
  - 📖 Spiegelman, M., (1968), *Introduction to Demography*, Harvard University Press.
  - 📖 Swanson, D.A. and Siegel, J.S., (2004), *The Methods and Materials of Demography*, Elsevier Academic Press.
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Year:	Code:	Marks:	Credits:	Duration:
Third Year	B-PHR-302	100	04	One Year
<b>Title: Mortality Estimation</b>				

### Aims of the Course

The aim of this course is to introduce students to the estimation of mortality by using various indirect techniques when necessary assumptions and underlying conditions break.

### Objectives of the Course

After completing this course, the students should have to

- learn the application of model life tables to the limited and defective data regarding mortality estimation;
- learn when and how to use indirect techniques in mortality research and
- build up knowledge and idea regarding application of demographic models in defective census and survey data.

### Learning Outcomes

A student who successfully completes the course will have the ability to

- conduct research regarding mortality parameters with adequate confidence;
- critically analyze defective census and survey data and
- identify errors of the mortality data along with the adjustment and interpretation of such data.

### Contents

**Demographic Models:** Background and concept, Demographic parameters, Mortality Research, Distribution of causes of death, Age pattern of mortality, Mortality models

**Indirect Methods in Demographic Estimation:** Concept of indirect techniques for mortality estimation, Need for indirect estimation for mortality estimation, Evaluation of indirect methods for mortality estimation. Basic concept and use of mortality models as indirect method

**Child Mortality Estimation:** Estimation of Child Mortality from Information on Children Ever Born and Children Surviving- Estimation of child mortality rates using data classified by age; estimation of child mortality using data classified by duration of marriage; estimation of inter survey cohort when the fertility experience of true cohort is known, Estimating infant mortality trends from child survivorship data.

**Adult Mortality Estimation:** Estimation of Adult Survivorship Probabilities from Information on Orphan-hood and Widowhood data: Conditional and Unconditional methods, Estimation of adult survivorship based on proportions not orphaned, estimation of adult survivorship based on proportions widowed, estimation of female survivorship from birth to adult ages on the basis of proportions with surviving mothers, estimation of survivorship from birth to adult ages on the basis of proportions not widowed. Estimation of adult mortality with maternal Orphan-hood data: analysis of sensitivity of the techniques, Adult mortality estimation using forward and backward projection.

**Adult Mortality Estimation from Incomplete Death Registers:** Estimation of adult mortality from information on the distribution of deaths by age: Preston and Coale method, Brass growth balance method, mortality estimation from registered deaths in less developed countries, Mortality estimation from registered deaths in less developed countries.

**Demographic Comparison for Mortality Estimation:** Estimation of adult mortality using successive census age distributions, Estimation of Mortality from Intercensal Survivorship

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Probabilities, Intercensal survivorship ratios for five-year age cohorts smoothed using the Coale-Demeny life tables, Intercensal survivorship ratios for five-year age cohorts smoothed by use of the logit system, Intercensal mortality estimated by using projection and cumulation, Intercensal survival with additional information on the age pattern of mortality, Estimation of a post-childhood life table from an age distribution and intercensal growth rates, Estimation of adult mortality using forward and backward projections, An integrated system for demographic estimation from two age distributions,

**Derivation of a Smooth Life Table from a Set of Survivorship Probabilities:** Smoothing and Interpolation of an incomplete set of survivorship probabilities, linkage of child survivorship probabilities with conditional adult survivorship probabilities (Linkage methods using a logit life-table system, use of coale-demeny model life tables).

**Mortality Estimation using Model Stable Age Distributions:** Background of methods for the general principles underlying the use of model stable populations for estimation purposes, Evolution of age distributions, computational procedures.

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**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

### **Assessment Methods**

#### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of mortality estimation. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### **Essential Readings**

The following textbooks (latest editions) are recommended:

- 📖 Bogue, D.J., (1969), *Principles of Demography*, Wiley.
  - 📖 Bogue, D.J., Arriaga, E.E., Anderton, D.L. and Rumsey, G.W., (1993), *Readings in Population Research Methodology*, United Nations Population Fund, Social Development Center, Chicago, Vol. 6.
  - 📖 Brass, W., (1963), *The Demography of Tropical Africa*, Princeton University Press.
  - 📖 Carrier, N., (1971), *Demographic estimation for developing societies: A manual of techniques for the detection and reduction of errors in demographic data*, London School of Economics, Population Investigation Committee.
  - 📖 Coale, A.J. and Demeny, P., (1983), *Regional Model Life Tables and Stable Populations*, Academic Press, New York.
  - 📖 Johnson, R.C.E. and Johnson, N.L., (1980), *Survival Models and Data Analysis*, Wiley & Sons, Inc.
  - 📖 Keyfitz, N., (1968), *Introduction to the Mathematics of Population*, Addison-Wesley Publishing Company.
  - 📖 Shryock, H.S., Seigel, J.S. and Stockwell, E.G., (1976), *The Methods and Materials of Demography*, Academic Press.
  - 📖 UN (1983), Manual-X, *Indirect Techniques for Demographic Estimation*, Department of International Economic and Social Affairs, Population Studies, No. 81.
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<b>Year:</b> Third Year	<b>Code:</b> B-PHR-303	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Methods of Human Resource Development</b>				

## Aims of the Course

This course aims to provide students with the comprehensive knowledge on different methodologies of Human Resource Management (HRM), Human Resource Accounting (HRA), measuring Human Resource Development (HRD), and measuring Human Capital (HC); which have become core practices of the contemporary organisations.

## Objectives of the Course

After completing this course, the students should have to

- impart basic knowledge on comprehensive components of HRM and the procedure of accomplishing different steps in HRM process;
- acquaint with basic organisational structure, organogram, and HRM software;
- learn different methods of assessing the value of employees of an organisation;
- outfit with the knowledge regarding different measurement techniques of the level of HRD and HC and
- be able to discuss and to explore the causal nexus of education with different developmental components.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- understand and accomplish different tasks (e.g. training, appraisal, leadership, motivation, etc.) of HRM process; they will also be able to handle HRM software;
- critically assess the value of manpower and measure the levels of HRD and HC in an organisation, which is very important to figure out the total assets of an organisation;
- achieve the skill of effective advocacy for emerging issues regarding HRM, HRA and HRD.

All of the aforementioned skills will help the students adapt any department of any organisation faster and sensibly. These skills will also be a great help of accomplishing managerial responsibilities with the progression of career.

## Contents

**Human Resource Management (HRM):** Concept of HRM; personnel management (PM); HRM model; job design; recruitment and selection; placement and induction; employee training; promotion, succession and career development; performance appraisal; motivation; communication; leadership; training and development; compensation administration; quality of work life.

**Human Resource Accounting (HRA):** concept of HRA; objectives of HRA; basic assumptions of HRA; role of HRA; potential impact of HRA; non-monetary model of HRA (input-output model); monetary model of HRA: net worth approach model, Lev-Schwartz model, Flamholtz model, net benefit model, Jaggi and Lau model; emerging issues of HRA.

**Measurement of HRD:** Qualitative and quantitative approaches; basic indicators; composite index. Statistical approaches - correlation and regression; criteria for classification of the levels of HRD; grouping of countries based on HD, HRD and HRD indices.

**Measurement of Human Capital Formation (HCF) Economic Approach:** Classification of human capital mechanism; total factor productivity; production function and correlation

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approach; human capital and application of new technology; human capital intensity; earning's streams; stock indices of education. enrolment indices; weighted skill index; statistical relationship index of human capital intensity and indices of economic development.

**Education and Manpower:** Organization structure of education and manpower; education and manpower systems; relationship between formal education and on the job training; economic analysis of various aspects of education; efficient utilization of high - level manpower. Models for adjustment of productive system and human capital.

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**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

### Assessment Methods

#### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of methods of human resource development. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### Tutorial Examination

There will be (minimum) three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Aswathapa, K., (2009). *Human Resource Management*. Fifth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.
  - 📖 Bhatia, B.S., G.L., Verma, H.L. and Garg, M.C., (1997), *Studies in Human Resource Development*, Deep and Deep Publication, India.
  - 📖 Bhattacharya, D.K., (2002), *Human Resource Planning. First Edition*, Anurag Jain Publication, Naraina, New Delhi.
  - 📖 Decenzo, D.A. and Stephen P. R., (1989), *Personnel/Human Resources Management*, New Delhi, Printice Hall of India.
  - 📖 Desai, A.S., (1979), *Human Capital Formation and its Utilization*, Sterling Publishers Pvt. Ltd., New Delhi.
  - 📖 Dessler, G. and Varkkey, B., (2011), *Fundamentals of Human Resource Management; Contents, Competencies, and Applications*, Dorling Kindersley Pvt. Ltd., India.
  - 📖 Dudeja, V.D., (2003), *Information Technology and Human Resource Development*, Commonwealth Publishers, New Delhi.
  - 📖 Harbison, F. and Myers C. A., (1964), *Education, Manpower and Economic Growth: Strategies of Human Resource Development*, McGraw-Hill, Inc. USA.
  - 📖 Gould, W.T.S., (2009), *Population and Development*, Routledge.
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<b>Year:</b> Third Year	<b>Code:</b> B-PHR-304	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Population Genetics</b>				

## Aims of the Course

This course is designed to introduce students with basic population genetic events and statistical analysis of such genetic events. This course also introduces students to necessary statistical techniques for studying variations and effects of those genetic events in human population regarding contemporary human genetics research and relates it with human population studies and research.

## Objectives of the Course

After completing this course, the students should have to

- develop a conceptual understanding of population genetics and statistical analyses of genetic issues;
- apply assembled knowledge to real-world situations and problem-solving contexts in relation to human population studies.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- define and describe key theoretical concepts of population genetics;
- use empirical methods and statistical tools to describe levels and patterns of genetic diversity and differentiation in populations and to infer and assess population genetic structure;
- comfortably understand contemporary research of modern population genetics and make contribution to those research.

## Contents

**Some Concepts:** Chromosomes and genes; Genotype and phenotype; dominance and recessiveness; autosomal linkage; Crossing over; sex-linked inheritance; Genotype and phenotype distributions.

**Genotypes and Phenotypes:** Simple combinational problems; Generating functions; The number of genotypes and phenotypes; Evaluation of phenotypic ratio in inter-crosses and back-crosses; epitasis.

**Equilibrium Laws:** Concept of gene frequency; Random mating; Matrix theory of random mating; Hardy-Weinberg law; Gamete and genotype distributions in the nth generation under random mating; application of matrix algebra; Gene frequencies in the nth generation; Theorem on genetic equilibrium in a randomly mating population. equilibrium for x-linked gene.

**Genetic distribution:** Bayes theorem; A posterior probability; Generalised forms of Bayes theorem; Mating types and their offspring; Single autosomal locus with multiple alleles; Joint parent-child distribution; conditional distributions of child genotypes when the parent's genotype is given and vice-versa; Joint grandparent grandchild distribution; Ancestral correlation; Joint parent-child distribution and their correlation for x-linked genes; Joint full-sib distribution and their correlation coefficient; Snyder's ratios.

**Inbreeding and Non-random mating:** Inbreeding; Identities of genes; Coefficient of inbreeding of an individual; Malecot's definition; Consanguinity of two individuals; Malecot's coefficients of parentage; The structure of a population subject to inbreeding; Wright's definition

of the coefficient of inbreeding and relationship; Genotypic mean and variance in a population with inbreeding. regular breeding system; mixture of selfing and random mating in a population; Inbreeding in randomly mating population of finite size; Inbreeding in a population divided into isolates; Wahlund's principle; Assortative mating.

**Human Blood Groups:** Introduction; Serology and blood groups; Inheritance of blood antigens; Genetic of the  $A_1A_2BO$ -blood group system and its association with the H and Se loci; Interaction of the ABO; Rh and Sese (secretion) loci; Estimation of gene frequencies in blood group systems; Bernstein's method of estimating the ABO gene frequencies; The maximum likelihood estimator of the ABO gene frequencies; Gene-counting estimators of the ABO gene frequencies; Efficiency of Bernstein's estimators; Estimation of the gene frequencies in the different blood groups; Rh factor; Estimation of the gene frequencies in the  $A_1A_2Bo$  blood system; The Lewis blood group system;  $MNS_S$  blood group system & gene frequencies estimation procedures by various method.

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**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

### Assessment Methods

#### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population genetics. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### Tutorial Examination



There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### Essential Readings

The following textbooks (latest editions) are recommended:

#### Core Books

-  Elandt- Johnson, R.C., (1971), *Probability Models and Statistical Methods in Genetics*, John Wiley & Sons, Inc.
-  Hamilton, M.B., (2009), *Population Genetics*, Wiley-Blackwell.

**Students may wish to work with an alternative introductory text. The alternatives I would recommend are**

-  Bartlett, M.S., (1960), *Stochastic Population Models in Ecology & Epidemiology*, Methuen, London.
  -  Ewens, W.J., (2004), *Mathematical Population Genetics: I. Theoretical Introduction*, Springer.
  -  Kempthorne, O., (1957), *An introduction to genetic statistics*, John Wiley & Sons.
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<b>Year:</b> Third Year	<b>Code:</b> B-PHR-305	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Population Redistribution and Urbanization</b>				

## Aims of the Course

To introduce students to the key issues of contemporary urbanization and population redistribution due to the change of global settings and their consequences on socio-economic, demographic and ecological system.

## Objectives of the Course

After completing this course, the students should have to

- learn different issues of population redistribution;
- identify and figure out the causes, consequences, levels and trends of rural-urban migration;
- be acquainted with the inner meaning of urbanization with causes and consequences as well as the sources of urbanization data.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- critically demonstrate the causes and consequences of urbanization;
- introduce policies to control rural-urban migration mechanism that will enhance the socio-economic potency.

## Contents

**Population Redistribution:** Concept of population redistribution; as a component of socio-economic development. The Lewis model for redistribution; Experience of rural-urban migration in LDC. Population redistribution in the process of demographic; Ecological; job potential; Human settlements and diversification of public utilities influencing intra and inter-regional migration. Regional planning and population redistribution.

**Urbanization:** Concepts of Urbanization and its measures; Causes of urbanization; Benefit of urbanization. Lorenz Curve and Gini's Concentration ratio; Trends in DC and LDC factors influencing urbanization trends; Implication of urbanization for demographic process. City growth; Its structure and functions; Metropolitonisation. Projection of urban populations. Urbanization and industrialization; Effects of urbanization on human health, environment and economy. Concept of over urbanization; Counter urbanization; Causes of counter urbanization. Todaro model for urbanization.

**Urban Planning:** Concept, scope, nature, uses and importance of urban planning; Basic roles and principles of urban planning; Types of urban planning: Urban planning of developed and developing countries; Present and future urban planning in Bangladesh; Consequences of urban planning in developed and developing countries.

**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.



## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population redistribution and urbanization. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Barclay, G.W., (1958), *Techniques of Population Analysis*, Wiley.
  - 📖 Bougue, D.J., (1969), *Principles of Demography*, Wiley.
  - 📖 Demko, G.J., Rose, H.M. and Schnell, G.A., (1970), *Population Geography: A Reader*, McGraw-Hill.
  - 📖 Hauser, P.M., (1972), *The Study of Population: An Inventory Appraisal*, University Press.
  - 📖 Shryock, H.S., Seigel, J.S. and Stockwell, E.G., (1976), *The Methods and Materials of Demography*, Academic Press.
  - 📖 Spiegelman, M., (1968), *Introduction to Demography*, Harvard University Press.
  - 📖 Todaro, M.P., (1977), *Economic Development in the Third World: An Introduction to Problems and Policies in a Global Perspective*, Longman.
  - 📖 Todaro, M.P., and Smith, S.C., (2002), *Economic Development*, 8<sup>th</sup> edition, Pearson Education.
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<b>Year:</b> Third Year	<b>Code:</b> B-PHR-306	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
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## **Title: Population Health and Nutrition**

### **Aims of the Course**

The course aims to introduce students to the health related policies, programs and issues along with different measures of such events based on contemporary global settings. This course also introduces students to the food and nutrition components necessary to maintain sound health along with different measures of understanding.

### **Objectives of the Course**

After completing this course, the students should have to

- learn concepts and methodologies of measurement of health status;
- become skilled regarding food, nutrition and different health related services provided by the government and non-governmental organizations to maintain sound individual, family and country wide health status;
- acquire knowledge to explain the changing patterns of health according to socio-economic and demographic characteristics.

### **Learning Outcomes**

A student who successfully completes the course will have the ability to

- provide critical opinions of different field of human health and nutrition and their issues and controversies;
- provide significantly effective contribution in construction of health and nutrition policies, programs and issues.

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### **Contents**

**Health:** Basic concepts of health; Chronic conditions; Acute conditions; disability; Impairments; Duration of illness; Attitudes toward health maintenance; Health services; Health care physician services; Mental services; Hospitalization; Institutional care; Evaluation of the respondent; The physician and hospital data; Health care data; Morbidity concept and measures: Illness; diseases and their classifications; epidemic and endemic, multiple causation of disease, measuring disease frequency and errors in measurement.

**Nutrition:** Concepts of food and nutrition; Classification of foods; Food hygiene; Food borne diseases; Food fortification; Adulteration of foods; Constituents of nutrition's nutritional classification: carbohydrates-protein-vitamins-minerals-fats; Their functions; Effect of deficiency; Treatment; Dietary sources; Glycaemic index; Stunting; wasting; Underweight; Z-score; Methods of estimating malnutrition and special emphasis on anthropometrics indicators; Gomez and Waterloo classification in nutritional measurement; standard scales in nutritional measurements; Effects of nutrition on fertility; Nutritional aspects of human lactation; Nutrition in Bangladesh; Special emphasis on infant and child nutrition.

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**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population health and nutrition. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Bell, D.E. and Reich, M, (1988), *Health, Nutrition and Economic Crises: Approaches to Policy in the Third World*, Auburn House Publishing Company.
  - 📖 Edelstein, S., (2011) *Nutrition in Public Health*, Jones & Bartlett Learning.
  - 📖 Mosley, W.H., (1977), *The Effect of Nutrition on Natural Fertility*, Cholera Research Laboratory, Scientific Report, No. 3.
  - 📖 Passmore, R., Nicol, B.M., Rao, M.N., Beaton, G.H. and Demayer, E.M., (1974), *Handbook of Human Nutritional Requirements*, FAO and WHO.
  - 📖 Spiegelman, M., (1968), *Introduction to Demography*, Harvard University Press.
  - 📖 Thomson, A.M. and Black, A.E., (1975), *Nutritional Aspect of Human Lactation*, Bull, WHO, Vol. 52.
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Year:	Code:	Marks:	Credits:	Duration:
Third Year	B-PHR-307	100	04	One Year
<b>Title: Population, Resource and Environment</b>				

## Aims of the Course

The aims of the course are to equip students with knowledge regarding population, resources and environmental pollution and degradation. The key aim is to introduce students to the consequential behavior of population, resources and environment.

## Objectives of the Course

After completing this course, the students should have to

- provide the basic concept of environment, environmental pollution & degradation and resources including natural and artificial as well;
- learn about the implications of green house effect and acid rain in the global context;
- achieve ability to provide different policies and programs regarding environmental problems and issues.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- critically explain the linkages between population, resources and environment;
- understand and figure out the impact of population growth on food, resources and environment. Also figure out technological development and its effect on human health and environment.

## Contents

**Introduction:** Concepts of environment; Man-environment relationship; Ecosystem; food-webs; Food chain; Food supply; Weather and climate.

**Resource:** Concept of resource; Land; Water; Forest; Mineral and energy resources.

**Environmental Degradation:** Concept of degradation; Cause of environmental degradation; Population growth; Deforestation; Agriculture development; Industrial development; Urbanization; Modern productive technology and environmental degradation.

**Extreme Event, Hazards and Disaster:** Environmental hazards and disaster; Natural hazards and disasters-earthquakes floods and tropical cyclones and local storms; Man-induced hazards; Social response to hazards and natural disaster reduction and management.

**Environmental Pollution:** Concept of environmental pollution; Air; Water; Noise pollution; Solid wastes; Pollution by heavy metals (Lead; Mercury; Cadmium; Arsenic) radiation; Soil pollution (Fertilizer; Parasites; Insecticides); effect of human activity and global cycles: green house effect; Acid rain; Carbon; Nitrogen and phosphorus cycles.

**Environment and Society:** Environmental problems in LDC and DC's; Measuring environmental disruption and impact; Environment and problems of population illiteracy, Poverty and cultural factors;. Environment and economics; Environment and urban growth; Resource and environmental stress for DC and LDC; Problems of transfer of technologies; Environment problems in Bangladesh and policy impact of population growth.

**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

## Assessment Methods

### Final Examination

The examination paper will contains 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population, resource and environment. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Boserup, E., (1976), 'Environment, Population and Technology in Primitive', *Population and Development Review*, Vol. 2, pp.21-36.
  - 📖 Davis, K. and Bernstam, M.S., (1991), 'Resources, environment, and population: present knowledge, future options', *Population and Development Review Supplements*, Vol. 16, Population Council.
  - 📖 Dobkowski, N.M. and Wallimann, I.(ed.), (2002), *On The Edge of Scarcity: Environment, Resource, Population, Sustainability and Conflict*, Syracuse University Press.
  - 📖 Ehrlich, P.R. and Ehrlich, A.H., (1970), *Population Resources Environment: Issues in Human Ecology*, Freeman.
  - 📖 Ehrlich, P.R. and Ehrlich, A.H., (1970), *The Population Explosion*, Simon & Schuster.
  - 📖 John, B., (1992), 'Population Growth and Global Warming', *Population and Development Review*, Vol. 18(2), pp.299-319.
  - 📖 Repetto, R.C., (1987), *Population, Resources, Environment: An Uncertain Future*, Population Reference Bureau.
  - 📖 Simon, J.L. (ed.) (1996), *Population Matters: People, Resources, Environment and Immigration*, Transaction Publishers.
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<b>Year:</b> Third Year	<b>Code:</b> B-PHR-308	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
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## Title: Labour Force and Manpower Planning

### Aims of the Course

The aim of the course is to equip students with the necessary knowledge regarding labour force in different branch of economy and measures of their activities. The course also aims to introduce students to the theory of planning and analysis of manpower to ensure better economic development.

### Objectives of the Course

After completing this course, the students should have to

- provide necessary skills regarding concept and classification of labour force and manpower planning;
- be equipped with different measures of labour force participation and planned number of manpower along with necessary concept of wage and salary differentials;
- be equipped with information regarding female labour force in readymade garment's factory in Bangladesh as well as future requirements of manpower in all sectors.

### Learning Outcomes

A student who successfully completes the course will have the ability to

- discriminate economically active and not active population and manpower to study manpower demand and supply in organizational and national levels;
- deepen their capability on labour market, employment and unemployment situation within national and international context;
- generate policies to minimize the labour conflict and turnover in context of wage and salary differentials of the present and future labour market.

### Contents

**Introduction:** Basic concept and definitions of economically active population, working force, the labour force, job characteristics, employed persons, unemployed persons, occupation, industry, class of worker, labour mobility and its classification, sources of data, collection of working population data, income and lifetime earnings.

**Labour force:** Dimensions, trends and patterns of population in labour force, factors affecting labour force, problem of labour force, child labour, female labour force participation, problem of female labour force, the older worker, garments labour force, seasonal unemployment and its consequences,

**Labour force Structure:** Structure of labour force based on Industry, occupation and status.

**Measures of economic activity:** Crude activity rate, general activity rate, sex specific activity rate, age-sex specific activity rate, age-sex adjusted or standardised activity rate, dependency ratio, replacement ratio and rates for working ages, measures of employment rate, unemployment rate, proportion fully employed, proportion unemployed, labour force participation rates, labour turnover, accession and separation rates, gross labour force change, dynamic of labour force, working life tables.

**Manpower Planning:** Concept of manpower and its planning, manpower planning process, job analysis, job description, job specification, helpful tools of manpower planning process, manpower utilization, information for manpower planning, statistical analysis of manpower

planning, developing manpower plans, labour market analysis, workforce analysis, manpower forecasting, Measures of planned manpower, Models of manpower forecasting.

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**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

### **Assessment Methods**

#### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of labour force and manpower planning. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### **Essential Readings**

The following textbooks (latest editions) are recommended:

- 📖 Bartholomew, D.J., (1976), *Manpower Planning: Selected Readings*, Penguin.
  - 📖 Grinold, R.C. and Marshall, K.T., (1977), *Manpower Planning Models*, North-Holland Publications.
  - 📖 Ofosu, Y. and Farooq, G.M., (1992), *Population, Labour Force and Employment: Concepts, trends and policy issues*, International Labour Organisation.
  - 📖 Shryock, H.S., Seigel, J.S. and Stockwell, E.G., (1976), *The Methods and Materials of Demography*, Academic Press.
  - 📖 Spiegelman, M., (1968), *Introduction to Demography*, Harvard University Press.
  - 📖 Vajda, S., (1978), *Mathematics of Manpower Planning*, Wiley.
  - 📖 Walker, J.W., (1980), *Human Resource Planning*, McGraw-Hill.
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**B-PHR-310**  
**Practical**  
**Full Marks=150; Total Time: 30 Hours**

**Session I (Population Projection)**

- (i) Intercensal and Postcensal Estimation of National Total Population by various methods
- (ii) Projection of National Female Population by Age
- (iii) Projection of other estimating procedures

**Session II (Mortality Estimation)**

- (i) Estimation of Child Mortality by different methods
- (ii) Estimation of Adult Mortality by different methods

**Session III (Population Genetics)**

- (i) Estimation of gene frequencies and their standard errors
- (ii) ML estimates of parameters
- (iii) Estimation of coefficients and moments

**Session IV (Population Redistribution and Urbanization)**

- (i) Distribution of population by ethnic composition and by residence
- (ii) Percentage distribution of urban population
- (iii) Calculation of center of population
- (iv) Calculation of population concentration- Gini Concentration Ratio, Duncan's Index of Population Concentration, Lorenz Curve
- (v) Calculation of Rank and Expected size of different cities

**Session V (Population, Resource and Environment)**

- (i) Calculation of the Index of Environmental Impact (IEI)
- (ii) Calculation of CO<sub>2</sub> from GDP

**Session VI (Labor Force and Manpower Planning)**

- (i) Calculation of different types of activity rates
- (ii) Calculation of different types of employment rates
- (iii) Calculation of labour turnover and accession rates
- (iv) Calculation of labour participation rates and dependency ratio, replacement ratio and rates for working ages
- (v) Construction of Working Life Table
- (vi) Level and trend discussion of labour force



<b>Year:</b> Fourth Year	<b>Code:</b> B-PHR-401	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Fertility Estimation</b>				

## Aims of the Course

The aim of this course is to introduce students to the estimation of fertility by using various indirect techniques when necessary assumptions and underlying conditions break.

## Objectives of the Course

After completing this course, the students are expected to

- understand indirect fertility estimation techniques, and when and how to use techniques for fertility estimation;
- learn how to estimate, analyse, write report and present fertility indicators using data obtained from various sources including registration system, census, and sample survey.

## Learning Outcomes

A student who successfully completes the course will have the ability

- to use R-programming language and spreadsheet for fertility research;
- regarding written, communication, teamwork, numeracy, problem solving, analytical and presentation skills.

## Contents

**Introduction:** Fertility Research, Measures of Fertility Levels and Trends, Descriptive Fertility Analysis, Birth History Analysis, Basic Concepts of Fertility Models, Nuptiality Models, Fertility Models: Coale and Trussell Model, Brass Relational Gompertz Fertility Model, Age-Period-Cohort (APC) Model, Davis-Blake Framework, Bongaart's Model.

**Indirect Measures:** Definition and Purpose of indirect techniques for fertility estimation, Evolution of indirect methods for fertility estimation, Errors in Children Ever Born Data, Techniques to reduce errors in CEB data, Procedures for converting ACEB Rates into Fertility Rates

**Fertility Estimation Based on Children Ever Born:** P/F ratio methods, El-Badry correction for Zero Parity, Methods of the Brass type based on comparison of period fertility rates with reported average parities, Estimation of age-specific fertility from the increment of cohort parities between two surveys, Estimation of fertility from information on CEB by duration of marriage, Arriaga technique- Estimation of fertility from data on CEB by age of mother.

**Fertility Estimation Based on Age Data:** Reverse Survival Technique for fertility estimation, Estimation of birth rate by reverse survival of the population under age 10, the own children method of fertility estimation, simplified robust estimate of birth rate.

**Fertility Estimation Based on Multiple Regression of Indicators:** The Rele procedure for indirect estimation of fertility, the Palmore regression fertility estimation procedure, Empirical interrelationships among standard fertility measures, Ariaga transformations.

**Fertility Estimates Based on Models:** Robust estimation of fertility by the use of model stable populations, Calculation of age-specific fertility schedules from tabulations of parity in two censuses, Fitting age-specific fertility with a truncated Pearson type III curve.

**Fertility Estimation Based on Model Stable Age Distributions:** General principles underlying

the use of model stable populations, Typical patterns of the birth rate estimates, Fertility estimates from the proportion of the population under age 15 and the probability of surviving to age 5, Estimation of the expectation of life at age 5 and of the death rate over age 5 from the proportion under age 15 and the rate of increase.

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**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

### **Assessment Methods**

#### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of fertility estimation. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### **Essential Readings**

The following textbooks (latest editions) are recommended:

- 📖 Bogue, D.J., Arriaga, E.E., Anderton, D.L. and Rumsey, G.W., (1993), *Readings in Population Research Methodology*, United Nations Population Fund, Social Development Center, Chicago, Vol. 6.
  - 📖 Brass, W., (1973), *The Demography of Tropical Africa*, Princeton University.
  - 📖 Carrier, N. and Hobcraft, J., (1971), *Demographic estimation for developing societies: a manual of techniques for the detection and reduction of errors in demographic data*, London School of Economics, Population Investigation Committee.
  - 📖 Chandrasekaran, C. and Hermalin, A.I., (1975), *Measuring the Effect of Family Planning Programs on Fertility*, Ordina Editions.
  - 📖 Pollard, A.H., Yusuf, F., Pollard, G.N., (1990), *Demographic Techniques*, Pergamon Press.
  - 📖 UN (1983), *Manual-X, Indirect Techniques for Demographic Estimation*, Department of International Economic and Social Affairs, Population Studies, No. 81.
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Year:	Code:	Marks:	Credits:	Duration:
Fourth Year	B-PHR-402	100	04	One Year
<b>Title: Life Time Data Analysis</b>				

## Aims of the Course

The course's aim is to introduce statistical techniques for modeling and analyzing life time data. This course also aims to include time-varying covariates for survival data analysis.

## Objectives of the Course

After completing this course, the students should have to

- be familiar with complex data structures including censoring and truncation, time-varying covariates, competing risk, recurrent and multivariate events associated with life time data analysis;
- determine and able to apply appropriate survival data analysis methodology for specific study;
- be competent with collecting, presenting, modeling and analyzing ability of life time data from different human population related sources and other technological commodity related sources.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- assess epidemiology and healthcare outcomes with efficient analytical skills;
- articulate research needs for improving existing methods and developing new methods;
- design a research plan to develop, evaluate, and compare life time data analysis methods.

## Contents

**Survival Analysis:** Basic concepts of failure; Intensity of failure; Lifetime; survivor function; Hazard function; Conditional probabilities of failure; Central failure rate and their interrelationship; Method of statistical differentials for expectation; Variance and quartiles of lifetime distributions; Study of non-parametric methods for estimating survivor and related functions.

**Proportional Hazard Model:** Concept of proportional hazards, Baseline hazard and survivor function. Estimation of proportional hazard models: Cox's conditional likelihood – function, complete likelihood and Marginal likelihood function. Exponential order score test Man *et al* test.

**Distribution of Survival Data:** Study of IFR; DFR; CFR; location and scale parameters of families of distributions-uniform; Exponential; Weibull; Extreme Value & Gamma distributions.

**Incomplete data analysis:** Types of censoring; Construction of likelihood function with censored data; Estimation of life parameters and their sampling variances from exponential; Weibull and extreme value distributions using type I and type II censoring data.

**Bio-medical Assays:** Introduction biological assays and their classifications; Median effective dose; sensitivity and potency of test; Preparation and their estimation through direct and indirect assays; Prospective; Retrospective and cross-sectional study designs; study of prevalence; incidence; Risk factors and their uses; Classification; Screening test; Clustering of diseases.

**Delivery Modes** Contact teaching, group discussion, homework and practical exercises completion and presentations.

**Course Materials** Copies of lecture presentations will be handed out at the lecture time.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of life time data analysis. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

### Further

Homework /Assignment, Class Participation and Oral Presentation.

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### Essential Readings

The following textbooks (latest editions) are recommended:

#### Core Book

- 📖 John P Klein and Melvin L Moeschberger,(1997), ‘Survival Analysis-Techniques for Censored and Truncated Data’, Springer-Verlag: New York

#### Recommended Materials

- 📖 Jerald F Lawless (2003, 2nd ED) *Statistical Models and Methods for Lifetime Data* John Wiley: New York
- 📖 Marubini E. and Valsecchi MG (1995), ‘Analysing survival data from clinical trials and observational studies’, Wiley and Sons: Chichester.
- 📖 Kalbfleisch, J.D. and Prentice, R.L. (1980), ‘*The Statistical Analysis of Failure Time Data*’, John Wiley: New York.
- 📖 Fleming, T.R. and Harrington, D.P. (1991). ‘*Counting Process and Survival Analysis*’, John Wiley: New York.
- 📖 Byron, Brown and Hollander, ‘*Statistics a Biomedical Introduction*’, John Willey and Sons

**Students may wish to use with an alternative introductory text and they also able to use internet for convenient of his/her study.**

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<b>Year:</b> Fourth Year	<b>Code:</b> B-PHR-403	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Mathematical Demography</b>				

## Aims of the Course

The aim of the course is to provide mathematical proof and judgment of basic terms, procedures and models used in demographic analysis.

## Objectives of the Course

After completing this course, the students should have to

- understand the basic terms and functions regarding fertility, mortality, migration, fecundity, reproduction and maternity with mathematical proof;
- learn and apply various deterministic and stochastic population models with mathematical justifications and proofs;
- extend the assembled demographic knowledge for further development of theoretical demography.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- apply more sophisticated quantitative methods for evaluation of demographic events;
- work with real data and achieve the capability to apply their know-how for policy making.

## Contents

**Deterministic Population Models:** Concepts of deterministic population models; Continuous time model of Sharpe and Lotka; Stable age distribution; Numerical values of  $R_0$ ; and Curve fitting of net maternity function; Momentum of population growth.

**Relationship of Demographic Variable in Stable Population:** Relations in closed population; Relation under stability; Application of stable theory; Effect of fertility and morality change on age distribution.

**Sampling Variance of Demographic Characteristics:** Sampling variance of life table function; Fertility functions; A simplified approach to complex samples.

**Theory of Life Tables:** Mathematical concept of life tables; Concepts of stationary population; Application of multiple decrement table and related single decrement table; Multi-life status; Survival probability and optimum properties of the estimates of survival probability; The probability distribution of the number of survivors, joint probability distribution of the number of survivors; Joint distribution of the number of death.

**Population Projections:** Development of Leslie Projection Matrix. Properties of Leslie Matrix. Forward and backward operation of population projection.

**Micro Demography:** Fertility. Fecundity, fecundability and sterility. Effective fecundability. Residual fecundability estimation of measures of fecundability. Pearl Index. Effectiveness and efficiency of Family planning (FP) Methods.

**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of mathematical demography. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Biswas, S., (1988), *Stochastic Processes in Demography and Applications*, Wiley Eastern Limited.
  - 📖 Bougue, D.J., (1969), *Principles of Demography*, Wiley.
  - 📖 Chiang, C.L., (1984), *The Life Table and its Applications*, R.E. Krieger Publications.
  - 📖 Coale, A.J. and Demeny, P., (1967), 'Regional Model Life Tables and Stable Populations', *Cambridge University Press and Institute and Faculty of Actuaries*, Vol. **93(1)**, pp. 152-154.
  - 📖 Coale. A.J. and Demeny, P., (1983), *Regional Model Life Tables and Stable Populations*, Academic Press, New York.
  - 📖 Johnson, R.C.E. and Johnson, N.L., (1980), *Survival Models and Data Analysis*, Wiley & Sons, Inc.
  - 📖 Keyfitz, N. and Caswell, H., (2005), *Applied Mathematical Demography (Statistics for Biology and Health)*, 3<sup>rd</sup> Edition, Springer.
  - 📖 Keyfitz, N. and Caswell, H., (2006), *Applied Mathematical Demography*, Springer.
  - 📖 Keyfitz, N., (1968), *Introduction to the Mathematics of Population*, Addison-Wesley Publishing Company.
  - 📖 Pollard, J.H., (1973), *Mathematical Models for the Growth of Human Populations*, Cambridge University Press.
  - 📖 Shryock, H.S., Seigel, J.S. and Stockwell, E.G., (1976), *The Methods and Materials of Demography*, Academic Press.
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<b>Year:</b> Fourth Year	<b>Code:</b> B-PHR-404	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Population Policies, Programs and Issues</b>				

## Aims of the Course

The aim of this course is to introduce students to the core idea about population problems, formulated policies to mitigate the problems and finally application of policies through programs.

## Objectives of the Course

After completing this course, the students should have to

- identify the population problems, formulate policies to solve the population problems, and implement the policies throughout programs;
- know the aims and objectives of different existing plans of actions for solving population problems;
- determine the elements of population policies and achieve ability to invent effective policies regarding children, women, and aged population problems.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- understand of why and how to create appropriate and effective policies, introduce programs regarding policies to mitigate population problems and to assess the demographic consequences of various divergences of such population policies and programs for respective countries.

## Contents

**Population Policies:** Concept of population problems and population policies; Framework of a population policy; Elements of population policy making; Role of population data collection in policy-making. population influencing policy; Population responsive policies; Awareness of national and international population policies; Population policies relating to fertility and population growth; Mortality and mobility; Migration and urbanisation; Population redistribution and settlement; Manpower and employment; Family; Role of women; Children and aged population policies and development policies; Population and development integrated policy; Population policies of Bangladesh- past and present.

**Population Programs:** World population plan of action (1974) its objectives and main features; programme to regulate and control fertility through family planning; abortion; increase in age at marriage; pronatalist program; Anti-natalist program; Success and limitation of relevant programs in some countries; Millennium Development Goals (MDG).

**Population Issues:** Population Aging; Gender issues: Equity, Equality and Empowerment of women, Reproductive right; Arsenic issue (should be excluded); Population and Environmental issues (should be excluded); Poverty reduction strategic programs (PRSP).

**Population Problems:** Problems and issues related to population growth and its components. Unemployment, under-employment, poverty, political situation. ICPD Plan of Action (Cairo, 1994), Macau Plan of Action for the aged (Macau, 1998).

**Population Planning:** Planning and the role of population demographic consideration in planning. Planning for education, health and housing, population control and family planning

programmes. Projections in planning population and development integration: Experience from different countries. Framework for population and development research and planning.

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**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

### **Assessment Methods**

#### **Final Examination**

The examination paper will contains 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population policies, programs and issues. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

#### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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### **Essential Readings**

The following textbooks (latest editions) are recommended:

- 📖 May, J.F., (2012), *World Population Policies: Their Origin, Evolution, and Impact*, Springer.
  - 📖 Biswas, S., (1988), *Stochastic Processes in Demography and Applications*, Wiley Eastern Limited.
  - 📖 Roberts, G., (1990), *Population Policy: Contemporary Issues*, Praeger.
  - 📖 Eager, P.W., (2004), *Population Policy: From Population Control to Reproductive Rights*, Ashgate Publishing, Limited.
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<b>Year:</b> Second Year	<b>Code:</b> B-PHR-405	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b> One Year
<b>Title: Population Theory</b>				

### Aims of the Course

The aim of this course is to introduce students with the existing theories and core models of human population those determine and control human behavior, trends and their socio-economic development.

### Objectives of the Course

After completing this course, the students should have to

- understand the basic population theories;
- appreciate the implications of demographic factors on economic growth;
- achieve the necessary skills to analyse population problems;
- understand the principles involved in the economic assessment of population growth for its protection and restoration.

### Learning Outcomes

A student who successfully completes the course will have the ability to

- conduct research regarding population problems;
- identify, synthesis and criticise relevant published research literature;
- apply theories of population in a practical setting for mitigating problems and policy making.

### Contents

Malthusian theory of population; Malthusian trap; Basic model and its criticism; Biological theories of population; Social and economic theories of population; Marxist theory of population and socialist formulation; The neo-Marxist theory and critique of economic development; Optimum theory of population; Theory of demographic transition; Emerging theories in subfield of population; Recent contribution of Esterlin and Caldwell etc.; Micro-economic theory of fertility; demand for children in Less Developed Countries.

Trade theory and development conflict; Tradeoffs and choice among the alternative policies and competing objectives; Unemployment; Resource under utilization and surplus theory of trade.

Determinants of food demand; Population and affluence; The new international economic order.

**Population Models:** Exponential, Malthusian and Logistic Population Models. Stationary, stable and quasi-stable population models, economic demographic models – classical, neo-classical and empirical macro and micro models. Investment oriented models – cost benefit analysis. Fertility – mortality and migration models.

**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of population theory. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks..

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## Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Brenner, Y.S., (1966), *Theories of Economic Development and Growth*, Praeger.
  - 📖 Caldwell, J.C., (1976), 'Toward a Restatement of Demographic Transition Theory', *Population and Development Review*, Vol. 2 (3-4), pp. 321-366.
  - 📖 Easterlin, R.A., (1980), *Population and Economic Change in Developing Countries*, Chicago University Press.
  - 📖 Ronald, F., (1979), 'Economic development and the theory of international trade', *American Economic Review Proceedings*, Vol. 69(2), pp. 186-190.
  - 📖 Keyfitz, N., (1972), *Population Theory and Doctrine: A Hospital Survey in Petersen*, William (editor), *Readings in Population*, New York.
  - 📖 Todaro, M.P., (1977), *Economic Development in the Third World*, 3<sup>rd</sup> edition, Longman.
  - 📖 Todaro, M.P. and Smith, S.C., (2002), *Economic Development*, 8<sup>th</sup> edition, Pearson Education.
  - 📖 Teitelbaum, M.S., (1975), 'Relevance of Demographic Transition Theory for Developing Countries', *Science*, Vol.188.
  - 📖 UN, (1978), *The Determinant and Consequence of Population Trends*
  - 📖 UN, (1978), *The Population Debate: Dimensions and Perspectives*, vols. I & II.
  - 📖 UN, (1989), *Population and Development – Asian Population Studies*, Series No. 82, 88, 92.
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<b>Year:</b> Fourth Year	<b>Code:</b> B-PHR-406	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b>
<b>Title: Research Methodology</b>				

## Aims of the Course

This course provides an introduction to research methods and designs applicable in every aspects of research. The course introduces various research designs such as experimental and non-experimental including quantitative and qualitative research methods.

## Objectives of the Course

After completing this course, the students should have to

- identify and evaluate the clarity of the problem statement and consistency of results;
- determine the rationale of the research problem;
- identify the specific research question, hypothesis and objectives (general and specific) under investigation;
- appraise the thoroughness and relevance of the literature review;
- achieve the concept of research process, designs and methods (quantitative and qualitative).

## Learning Outcomes

A student who successfully completes the course will have the ability to

- identify the key characteristics of a good research;
- write proper research proposal, conduct quality research and evaluate the merits of existing research (qualitative and quantitative);
- write quality reports that will contribute to the modern research in global setting.

## Contents

**Fundamentals of Research:** Definition, method and methodology, objectives of research, types of research, characteristics of research, desirable qualities of research, areas of research. Research hypothesis, Research questions, Research objectives, Operational definition, Ethics in research

**Research Process:** Problem identification, literature review, objectives, hypothesis, research design, sample design, data collection, data processing - data coding, data editing, data analysis and report writing,

**Measurement; and Reliability and Validity in Measurement:** Level of measurement-nominal scale, ordinal scale, interval scale, ratio scale. Measurement error, Reliability and its measurement, standard error of measurement, Validity and its measurement. Constructing measurement scales.

**Sampling and Sample Design:** Concept of sampling, types of sampling, Sampling techniques, Design weight, Design effect, PPS sampling

**Data Collection:** Data collection. Sampling error, non-sampling error, measurement error. Quantitative data collection techniques, Qualitative data collection techniques, Additional data collection techniques: Nominal group technique (NGT), Delphi technique, Life histories, Essays, Case studies, Mapping, Rapid appraisal techniques or soundings, Panel study and, key informal approach. Data quality check.

**Questionnaire and its Construction:** Questionnaire, Schedule, observational check-list, content of questions, types of questions, Steps involved in designing a questionnaire, Pre-

testing, Post enumeration check, statistical methods to control the quality of data.

**Application of Statistical Tools in Research:** Central tendency, Dispersion, Measures of shape, correlation, regression, contingency analysis, different types of tests.

**Developing Proposal and Report Writing:** Proposal development, components of a proposal, Evaluation of proposal, Report writing.

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**Delivery Modes:** Contact teaching.

**Course Materials:** Copies of lecture presentations will be handed out at the lecture time.

## **Assessment Methods**

### **Final Examination**

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of research methodology. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### **Tutorial Examination**

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks..

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### **Essential Readings:**

The following textbooks (latest editions) are recommended:

- 📖 Kothari, C.R., (2004), *Research Methodology: Methods and Techniques*, New Age International (P) Limited, Publishers.
  - 📖 Panneerselvam, R., (2004), *Research Methodology*, Prentice-Hall of India Private Limited.
  - 📖 Bausell, R.B., (1991), *Advanced research methodology: an annotated guide to sources*, Scarecrow Press.
  - 📖 Benz, C.R. and Newman, I., (1998), *Qualitative-qualitative Research Methodology: Exploring the Interactive Continuum*, Southern Illinois University.
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<b>Year:</b> Fourth Year	<b>Code:</b> B-PHR-407	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b>
<b>Title: Human Resource Development Planning</b>				

## Aims of the Course

The aim of this course is to focus on different issues with remedies and strategies of Human Resource Development (HRD), techniques of education and manpower planning, which are indispensable in successful operation of organisations.

## Objectives of the Course

After completing this course, the students should have to

- be intimated to the existing HRD issues, nature and learn strategies to overcome HR problems;
- be equipped with different methods of manpower planning with practical workout;
- learn different techniques of manpower wastage analysis accompanied by exercise;
- acquire knowledge on important components of career, and the functional roles of these components in career path.

## Learning Outcomes

A student who successfully completes the course will have the ability to

- understand the emerging issues of HRD and they will be capable of devising innovative strategies to overcome these capricious problems;
- analyse the wastage and portraying the wastage pattern, and hence act independently to improve the situation;
- achieve the expertise to find out manpower demand and interact accordingly by sectors;
- achieve the capability of sketching the career pattern in a particular system.

Achieving the above skills will make the students an efficient manpower planner, who will be able to detect the manpower demand, spot issues in career pattern and HRD, portray the turnover pattern; and they will have the capability of responding to the issues independently which is very important for success of the business of organisation.

## Contents

**Problems, Issues and Strategies:** Generation and utilization of high-level manpower; Utilization of redundant manpower; Strategy of HRD with critical areas of choice; Consequences of strategies; Manpower strategies.

**HRD Planning:** The nature of human resource planning. Model for human resource planning; Human resource targets; Estimation of future requirements; Target-setting approach; Time perspective of HRD planning; The organization of HRD; Analysis of present situation.

**Techniques of Education and Manpower Planning:** Understanding education and manpower systems; Processes and stocks & flows of education models; Bottleneck systems; Flow mechanisms; Educational planning and decision making; Strategy of manpower planning; Analysis of wastage; rates and life table methods; Modeling; Prediction and measurement; Career pattern Promotion pattern; Relationship between promotion rates and career pattern; Statistical analysis of manpower data.

**Delivery Modes:** Contact teaching.

**Course Materials:** Printed lecture sheets are handed out among the students prior to the lecture/presentation. The listed books are available in seminar library of the department, central library and other covenanted online libraries. Besides these, other open access materials can also be accessed through course teacher's website (<http://www.popsru.org/academic/faculty/>) and other sites.

## Assessment Methods

### Final Examination

The examination paper will contain 15 questions from which the students will be asked to attempt 10. Total marks will be 100. The questions will be designed to test specific knowledge of human resource development planning. Each question may contain two sections, the first section will be theory and/definition based and the second section will be problem solving.

### Tutorial Examination

There will be three tutorial examinations will be in between the total lecture period. Each tutorial examination will be of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

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## Essential Readings

The following textbooks (latest editions) are recommended:

- 📖 Bartholomew D.J. and Forbes A.F. (1981). *Statistical Techniques for Manpower Planning*. Page Bros (Norwich) Ltd., Mile Cross Lane, Norwich, Norfolk, Great Britain.
  - 📖 Bartholomew D. J. (1982). *Stochastic Models for Social Processes*. Third Edition, John Wiley, New York.
  - 📖 Bhattacharya D.K. (2002). *Human Resource Planning. First Edition*. Anurag Jain Publication, Naraina, New Delhi.
  - 📖 Biswas S. (1996). *Statistical Techniques of Manpower Planning & Forecasting*. New Age International (P) Limited, Publishers, New Delhi.
  - 📖 Harbison F. and Myers C. A. (1964). *Education, Manpower and Economic Growth: Strategies of Human Resource Development*. McGraw-Hill, Inc. USA.
  - 📖 Shryock H.S., Siegel J.S. and et al. (1975). *The Methods and Materials of Demography*. Third Printing (rev.), U.S. Government Printing Office, Washington, D.C.
  - 📖 United Nations Development Programme (UNDP), *Human Development Reports*, Communications Development Incorporated, Washington DC.
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<b>Year:</b> Fourth Year	<b>Code:</b> B-PHR-408	<b>Marks:</b> 100	<b>Credits:</b> 04	<b>Duration:</b>
<b>Title: Field Study and Report.</b>				

### **Aims of the Course:**

The aim of this course is to focus on original first-hand research capacity building, that is, to make students as researchers to move investigating primary and documentary sources, pursue interviews with decision-makers, undertake observation of policymaking in congressional hearings, and initiate direct contact with relevant individuals and agencies concerned with their topic.

### **Objectives of the Course:**

After completing this course, the students should have to

- achieve the ability to review relevant literature;
- be equipped with the ability of identifying research problem, writing proposal and making effective questionnaire;
- learn different techniques of collecting data and analysis;
- formulate policy based on their first-hand research.

### **Learning Outcomes:**

A student who successfully completes the course will have the ability to

- find research problem and conduct first-hand pure research;
- critically evaluate existing research articles;
- take part in making policy to improve socio-economic and demographic phenomenon for sustainable development based on the contemporary global setting.

### **Contents:**

**Topic Selection:** The process of how to select appropriate research topic.

**The Problem:** Problem, Research Problem, Research Objectives, Hypothesis, Theory, Research Design and Sources of Documents.

**Conduction of Research:** Questionnaire Development, Data Collection, Analysis, Report Writing and Finalising.

**Delivery Modes:** Contact teaching.

**Course Materials:** The listed books are available in seminar library of the department, central library and other covenanted online libraries. Besides these, other open access materials can also be accessed through department website (<http://www.popsru.org/>) and other sites.

### **Assessment Methods:**

The student will write their report based on their research topic and submit to the department (four copies). The report will be evaluated under the curriculum of the faculty of Science. Total marks will be 100.

### **Essential Readings:**

The following textbooks (latest editions) are recommended:

- 📖 Booth, W.C., Colomb, G.G. and Williams, J.M., (2003), *The Craft of Research*, 2<sup>nd</sup> edition, Chicago University Press.
- 📖 Turabian, K.L., (1996), *A Manual for Writers of Terms Papers, Theses and Dissertations*, 6<sup>th</sup> edition, Chicago University Press.
- 📖 Joseph Gibaldi, J., (1995), *MLA Handbook for Writers of Research Papers*, 4<sup>th</sup> edition, Modern Language Association

**B-PHR-410**  
**Practical**  
**Full Marks=150; Total Time: 30 Hours**

**Session I (Fertility Estimation)**

- (i) Estimation of Fertility by different methods
- (ii) Evaluation of Age distribution

**Session II (Life Time Data Analysis)**

- (i) Non-parametric estimation of the survivor function
- (ii) Detection of life-time models: (a) Plotting procedure  
(b) M-statistics
- (iii) Estimation of life-time parameters by suitable estimation techniques for type-I, type-II, random and sequential censoring
- (iv) Estimation of confidence interval for life-time parameters for different life-time models under various censoring structure

**Session III (Mathematical Demography)**

- (i) Branching Processes, Limit Laws for Processes, Path-Sensitive Processes
- (ii) Hilbert's Projective Metric, Leslie Matrix, Renewal Equation and Lexis Surfaces
- (iii) Lotka's Equation and the Cumulant Expansion.
- (iv) Approach to Stability; Population Waves, Population Momentum
- (v) Wright-Fisher Models, Demographic Feedback Models
- (vi) Life tables, population stability

**Session IV (Human Resource Development and Population Theory)**

**HRD**

- (i) Wastage Analysis: Cohort Analysis, Census Analysis

**Population Theory**

- (i) Fitting Logistic Curve
- (ii) Application of Dalton's method
- (iii) Derive some mathematical model using trade data
- (iv) Micro economic theory of fertility
- (v) Establish a relationship between food and population

**Session V (Population Policies, Programs and Issues)**

- (i) Using demographic and Socio-economic data and their interrelationship
- (ii) Construction of different types of indices such as environmental index, development index and Ageing index and so on
- (iii) Report writing

**Session VI (Research Methodology)**

- (i) Sample size determination: various approaches
- (ii) Questionnaire development
- (iii) Writing of Research Reports and Policy implications
- (iv) Scaling Techniques



## Overview:

The Department of Population Science and Human Resource Development started in 1996 under the Faculty of Science, University of Rajshahi, Bangladesh. It began with two faculty members and seven supporting staffs by enrolling twenty five students and gradually increased the capacity of enrollment of students. Now there are 60 students enrolled in each session with around 300 students in total including M. Phil. and Ph. D. level students. There are 23 faculty members and 14 office staffs conducting the academic activities now.

The academic curriculum of the department is being regulated in English medium since its inception. Being inspired from the importance, this department introduced thirty courses in the B. Sc. honours level and eight courses at M. Sc. level including Demography, Statistics, Mathematics, Economics, Econometrics, Computer Programming, Population Health, Human Resource Development (HRD) and Environmental Studies.



## Courtesy

Self-Assessment of B.Sc and M.Sc Programs, PS&HRD, RU.  
Higher Education Quality Enhancement Project (HEQEP),  
The Ministry of Education, Bangladesh.