DEPARTMENT OF PUPULATION SCIENCE AND HUMAN RESOURCE DEVELOPMENT

Syllabus for M.Sc 2012-2013

Examination Years: 2013

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 support staff are currently conducting the academic activities.

The academic curriculum of the department is being offered in English medium since its inception. Given 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.

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.

M.Sc. Syllabus under Faculty of Science Curriculum for Academic Year 2012-2013 Examination 2013

The M.Sc programme in Population Science and Human Resource Development shall spread over one academic year. The programme is divided into two streams – the General Stream and the Thesis Stream. The thesis shall be offered to eligible students subject to the approval of the Departmental Academic Committee.

General Group: The examination shall consist of six theory courses out of which four courses are compulsory and two are optional. Six practical sessions of thirty hour duration (spread over six days).

Thesis Group: The examination shall consist of six theory courses out of which four courses are compulsory and two are optional.

The distributions of marks are given below:

Compulsory Theory Courses

Course No.	Title of the Courses	Marks	Unit	Duration of Examination
M.POPS 501	Demographic Models	100	1	4 hrs.
M.POPS 502	Human Resource Development in Bangladesh	100	1	4 hrs.
M.POPS 503	Reproductive Health	100	1	4 hrs.
M.POPS 504	Epidemiology	100	1	4 hrs.
	Total of Compulsory courses:	400	4	

Optional Theory Courses (any two)

Course No.	Title of the Courses	Marks	Unit	Duration of Examination
M.POPS 505	Population Modeling	100	1	4 hrs.
M.POPS 506	Econometric Methods	100	1	4 hrs.
M.POPS 507	Human Growth and Development	100	1	4 hrs.
M.POPS 508	Population, Environment & Sustainable Development	100	1	4 hrs.

Course No.	**Title of the Courses**	**Marks**	**Unit**	**Duration of Examination**
M.POPS 509	**Practical**: (Practical/Practical and In-plant. Training/Field Work Project etc. (30% marks to be allotted for continuous Lab assessment)	200	2	
	OR			**6x5 = 30 hours**
	Thesis : (Written dissertation 100, Practical In-plant Training 50+Seminar 50)	200	2	
M.POPS 510	Tutorial / Class assessment/home assignment	100	1	
M.POPS 511	Viva Voce	100	1	
	Grand Total:	**1000**	**10**	

M.Sc Practical Courses

Course No. M.POPS 509	Course Title Practical	
Session I	Demographic Models	
Session II	Human Resource Development in Bangladesh	
Session III	Reproductive Health	
Session IV	Epidemiology	
Session V	Population Modeling	**Any two sessions of the optional courses.**
Session VI	Econometric Methods	
Session VII	Human Growth and Development	
Session VIII	Population, Environment & Sustainable Development	

The Grading Systems:

(a) **Credit Point (CP):** The credit points achieved by an examinee for 1 (one) unit course shall be 4 (four).

(b) **Letter Grade (LG) and Grade Point (GP):** Letter Grades, corresponding Grade Points and Credit Points shall be awarded in accordance with provisions shown below:

Table of LG, GP and CP for credit courses

Numerical Grade	Letter Grade		Grade Point	CP/unit
80% or above	**A+**	(A Plus)	4.00	4
75% to less than 80%	**A**	(A regular)	3.75	4
70% to less than 75%	**A-**	(A minus)	3.50	4
65% to less than 70%	**B+**	(B Plus)	3.25	4
60% to less than 65%	**B**	(B regular)	3.00	4
55% to less than 60%	**B-**	(B minus)	2.75	4
50% to less than 55%	**C+**	(C Plus)	2.50	4
45% to less than 50%	**C**	(C regular)	2.25	4
40% to less than 45%	**D**		2.00	4
Less than 40%	**F**		0.00	0
Incomplete	**I**		--	0

Absence from the final examination shall be considered incomplete with the letter grade "I".

(c) Grade Point Average (GPA) and Total Credit Point (TCP): The weighted average of the grade points obtained in all the courses by a student and Total Credit Point shall be calculated from the following equations: GPA=Sum of $[(CP)_i \times (GP)_i]$ / sum of $(CP)_i$ and TCP = Sum of $(CP)_i$

Where $(GP)_i$ = grade point obtained in individual course, $(CP)_i$ = credit point for respective course, GPA = grade point average obtained, and TCP = total credit point obtained. GPA shall be rounded off up to 2 (two) places after decimal to the advantage of the examinee. For instance, GPA=2.112 shall be rounded off as GPA=2.12.

Year: Final Year	Code: M-POPS-501	Marks: 100	Credits: 04	Duration: One Year

Title: Demographic Models

Aims of the Course

The aim of this course is to introduce students to advance population modeling regarding fertility, mortality and migration. This course helps students to deepen their concepts with proficient skills about stochastic population models those are required for modern population and demographic research.

Objectives of the Course

After completing this course, the students should have to

- define basic concepts of demographic models on fertility, mortality and migration;
- compute basic demographic parameters on fertility, mortality and migration;
- learn demographic models and fitting procedures with demographic data along with error minimizing strategies;
- learn the habits of thought, knowledge, understanding and application of demographic models.

Learning Outcomes

A student who successfully completes the course will have

- the ability to understand existing mathematical models and formulate new models, if required, for analyzing population and demographic data;
- developed critical skills regarding analysis and interpretation of population and demographic data;
- the ability to critically evaluate research articles that will enhance the quality to meet the contemporary global needs.

Contents

Fertility Models: Certain Basic Stochastic Population Models**,** Mathematical Models on Fertility and Human Reproductive Process: Dandekar's Modified Binomial and Poisson Distribution, Development of the Model, William Brass Model, Models for the Waiting Time of Conception, Problems for the Development of the Model of the Inter-arrival Waiting Time Distribution, Distribution of Time of Birth, Inter-live Birth Intervals, Sheps and Perrin Model of Human Reproductive Process, Models for First Conception and First Birth, Multiplicative Models and Cohort Analysis, Page Model, Target-Setting Model

Mortality Models: Graduation of Mortality Curves, Makeham's Model, Gompertz Model, Fitting of Gompertz and Makeham Curves, Frailty on the Dynamics of Mortality, Effects of Age, Period and Cohort on Mortality Rates, Expectation of life and its Relationship to Mortality, Measurement and Interpretation of Proportinate Mortality, design Problems and Data Collection Strategies in Studies of Mortality Differentials, Mortality Models based on Delays/ Cause Elimination Model

Migration Models: Push-Pull Hypothesis, Ravenstein's Law of Migration, Lee's Theory of Migration, Wolports Decision Making Aspects of Migration, Todaro's Model of Rural-Urban Migration, Mobility Field Theory, Zipf's Gravity Model.

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 demographic modeling. 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.

Essential Readings

The following textbooks (latest editions) are recommended:

- Newell, C., (1988), *Methods and Models in Demography*, John Wiley & Sons,Inc.
- Rumsey, G.W., (1993), Readings in Population Research Methodology, Vol. **2**, Mortality Research, United nations Population Fund, Social development Center, Chicago, USA.
- Biswas, S., (1988), *Stochastic Process in Demography and Applications*, Wiley Eastern Limited.
- Shryock, H.S., Seigel, J.S. and Stockwell, E.G., (1976), *The Methods and Materials of Demography*, Academic Press.
- Mishra, B.D., (1995), An Introduction to the Study of Population, South Asian Publishers Pvt Ltd.
- Todaro, M. P., (1976), *Internal Migration in Developing Countries*, International Labour Organization, Geneva.
- Bilsborrow R. E., (1981), *Surveys in Internal Migration in Low Income Countries: Issues of Survey and Sample Design*, ILO, Geneva.
- United Nations Population Fund Report (1993), Readings in Population Research Methodology Vol. **3**, Social Development Center, Chicago, USA.
- United Nations Population Fund Report (1993), Readings in Population Research Methodology Vol. **4**, Social Development Center, Chicago, USA.
- Rowland, D.T., (2003), *Demographic Methods and Concepts*, Oxford University Press.
- Yaukey, D. and Anderton, D.L., (2001), *Demography: The Study of Human Reproduction*, Waveland Press, Inc.

Year: Final Year	Code: M-POPS-502	Marks: 100	Credits: 04	Duration: One Year

Title: Human Resource Development in Bangladesh

Aims of the Course

The aim of this course is to introduce students to the comprehensive knowledge of different education systems and policies based on historical background and present practices along with problems of Human Resource Management (HRM) in Bangladesh. The course also provides students the real scenario of women's employment and the role of GOs and NGOs regarding national development.

Objectives of the Course

After completing this course, the students should have to

- impart basic knowledge on education policy and systems of developed and developing countries;
- learn regarding women employment and obstacles in different sectors like garments industry;
- achieve knowledge on HRM practices and constraints with competencies of transformational leadership in organizational levels;
- explore the role of GOs and NGOs for national development.

Learning Outcomes

A student who successfully completes the course will have

- understood the existing and previous education policies and systems those will help to innovate effective policies;
- the ability to understand the women employment issues and problems of effectiveness and to provide valuable suggestions regarding effectiveness of such issues;
- learnt the role of GOs and NGOs regarding national development;
- achieved the skill of effective advocacy for competencies of transformational leadership in organizational levels.

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

Contents

Bangladesh Education Policy: Present education policies: primary, secondary and tertiary education; Formal education system, comparison with developed country; Informal, non-formal education and training.

Human Resource Management in Bangladesh: Present practices - constraints and suggested measures. A model for the executive management of transformational change; transformation leadership; Competencies of transformational leaders.

Human Resource Development in Bangladesh: Historical perspectives, present situation, problems and issues, application, limitations.

Manpower Planning in Bangladesh: Nature and extent of manpower shortage in Banglaesh. Sectoral analysis - reasons for shortage or surplus - setting of development based upon reasonable expectations and growth - determination of the number of people needed in every occupation at some future data.

Women and Child Development in Bangladesh: Participation in economic activities -

preoccupation; Distribution, obstacles to expansion of female employment, measures to be taken - women in garments industry - women in agricultural sector - child development; its problem and remedial measures.

Sports and Cultural Development in Bangladesh: Review of past plan; Issues and constraints; Development program.

Youth Development in Bangladesh: Roles of GOs and N.G.O.s in HRD of Public-Private Bank and NGOs like: BRAC and PROSHIKA etc.

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 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 of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

Essential Readings

The following textbooks (latest editions) and reports are recommended:

- Bhatia, B.S, Verma, H.L., and Garg, M.C., (1997), *Studies in Human Resource Development, Emerging Dimensions of HRD Role and Orientation*, Deep and Deep Publications, New Delhi.
- Dessler, G. and Varkkey, B., (2009), *Human Resource Management*, 11the edition, Prentice Hall.
- Fukuda-Parr, S. and Shiva, K.A.K. (eds), (2003), Readings in Human Development, Oxford University Press.
- GoB (1995-1997), 'Bangladesh Economic Review', *Finance Division, Planning Commission, Ministry of Finance, Government of the People's Republic of Bangladesh.*
- GoB (1998), 'Fifth Five Year Plan', Financial year 1997-2002, *General Economics Division, Planning Commission, Ministry of Planning, Government of the People's Republic of Bangladesh.*
- GoB (2011), 'Sixth Five Year Plan: Accelerating growth and reducing poverty', Financial year 2011-2015, *General Economics Division, Planning Commission, Ministry of Planning, Government of the People's Republic of Bangladesh*.
- Haq, M.U., (1995), *Reflections on Human Development*, Oxford University Press.

Year: Final Year	Code: M-POPS-503	Marks: 100	Credits: 04	Duration: One Year

Title: Reproductive Health

Aims of the Course

The aim of this course is to introduce students to primary and advance theoretical knowledge, application and importance of the family planning, human reproductive system and health states to make them aware to reduce maternal and infant mortality rates which will ensure sound and healthy nation.

Objectives of the Course

After completing this course, the students should have to

- achieve fundamental knowledge regarding reproductive health and its importance to provide healthy nation;
- understand appropriate pre and post antenatal care systems of pregnant women;
- learn about effective family planning methods to produce well-planned family, society and nation.

Learning Outcomes

A student who successfully completes the course will have

- the ability to understand and share knowledge regarding better reproductive health and effective family planning methods to reduce maternal and child mortality rates;
- the ability to provide primary care and suggestions if complexity identified in the pregnancy period;
- the ability to aware entire society regarding reproductive health, reproductive health care and to provide better policies to improve health care system.

Contents

Fundamentals of Reproduction: Reproductive system, Ovary, Testis, Sex-accessories, Fallopian tube, Embryogenesis, Gametogenesis, Spermatogenesis, Oogenesis, Ovulation, Fertilization, Morula, Trophoblast, Implantation, Deciduas, Chorion and chorionic villi, Development of inner cell mass, Role of hormones in reproduction, receptors in sex organs, hormonal changes in menstruation, menopause, Steroidal hormones, Hormonal influences in lactation, Infertility.

Physiological Changes During Pregnancy: Genital organs, breasts, cutaneous changes, weight gain, body water metabolism, haematological changes, heart and circulation, metabolic changes, systemic changes.

Diagnosis of Pregnancy: Pregnancy and Pseudo-pregnancy, Pregnancy Trimester- First trimester, second trimester, Third trimester, Chronological appearance of specific signs and symptoms of pregnancy, Differential diagnosis of pregnancy, Signs of previous child birth, Estimation of gestational age and Prediction of expected date of delivery, Estimation of fetal weight, Haemorrhage in early pregnancy.

Antenatal Care, Counselling and Post Natal Care: ANC visits, ANC Care, Procedure of first visit, examination, procedure at the subsequent visits, antenatal advice, minor ailments in pregnancy, values of antenatal care, pre-conceptional counseling and care, summary, Antenatal Assessment of Fetal Wellbeing- Procedures of antenatal examination, special investigations, early pregnancy assessment, assessment in late pregnancy, other investigations in late, pregnancy, Post natal care and its mechanism

Labour: Definition, Normal labour, True labour, False labour, labour pains, Causes of onset of labour, Prolonged labour, Obstructed labour, Stages of labour, Events in different stages of labour, Mechanism of normal labour, Clinical course of labour- first stage, second stage, third

stage, place of delivery, management of different stages of labour, Complications of third stages of labour..

Puerperium: Normal Puerperium, Involution of the uterus, involution of other pelvic structures, lochia, general physiological changes, lactation, ovulation and menstruation, lactation, physiology of lactation, management of normal puergerium, management of ailments, post natal care.

Contraception: Objectives, Evaluation of Contraception and Family Planning, Control of conception, Ideal contraceptives, Contraceptive effect on Fertility, Oral Contraceptives**,** OCP preparations, OCP Types-combined type pill, mini pill and low dose pills, mode of action, side effects, biochemical functions, gynecological effects and metabolic effects in vitamins, carbo-hydrate, fat and protein, enzymatic effects of OCP, interaction of malnutrition, OCP and other foreign compounds, contraindication and indications, Emergency Contraception, Traditional Methods of Contraception-Various Traditional Methods-Coitus Interruption or Withdrawal, Rhythm Method or Safe Period, Lactation, Breast-feeding, Newer Methods of Contraception- Injectables, Implants, IUD, Permanent methods of sterilization, ligation and vasectomy.

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 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 of 40 marks. The average marks obtained from these three tutorial examinations will be added to the total marks.

Essential Readings:

The following textbooks (latest editions) are recommended:

- Dutta, D.C., (2004), *Text Book of Obstetrics: Including Perinatology and Contraception*, New Central Book Agency (P) Limited.
- Greep, R.O., Koblinsky, M.A. and Frederick S. J., (1976), *Reproduction and Human Welfare: A Challenge to Research,* The MIT Press.
- Guyton, A.C. and Hall, J.E., (2006), *Textbook of Medical Physiology*, 11th edition, Elsevier Inc.
- Neill, J.D., (ed.), (2005), *Knobil and Neill's Physiology of Reproduction*, 3rd edition, Academic Press.
- Park, K., (2011), *Park's Textbook of Preventive and Social Medicine*, 21st edition, Banarsidas Bhaton Publishers.
- Potts, M. and Diggory, P., (1983), *Textbook of Contraceptive Practice*, 2nd edition, Cambridge University Press.
- Tepperman, j., (2012), *Metabolic and Endocrine Physiology: An Introductory Text*, Literary Licensing, LLC.
- Villee, C.A. and Engel, L.L. (Eds), (1961), *Mechanism of Action of Steroid Hormones: Proceedings of the Conference Held at Endicott House, Dedham, Massachusetts*, Pergamon Press, Oxford.

Year: Final Year	Code: M-POPS-504	Marks: 100	Credits: 04	Duration: One Year

Title: Epidemiology

Aims of the Course

The aim of this course is to demonstrate the health related states of specified populations and to learn necessary tools with applications in order to associate and control risk factors (exposures) and diseases.

Objectives of the Course

After completing this course, the students should have to

- compare, contrast and correlate different health and diseases related events;
- define and describe different diseases and their preventive mechanisms;
- learn different methodologies to study epidemic variables and data.

Learning Outcomes

A student who successfully completes the course will have

- make a community diagnosis and effective health service;
- monitor the change of health conditions in a community over a continuous time period;
- practice surveillance for a specific disease in order to act quickly to cut any outbreak;
- investigate an outbreak of a communicable disease, analyze its reasons, plan a feasible remedy, carry out and monitor the effects of the remedy.

Contents

Introduction to Epidemiology: Basic concept of epidemiology, descriptive epidemiology, analytic epidemiology, health, disease, community health, vital statistics, morbidity and causality; Nature and uses of health statistics; Scope of Epidemiology; Key issues in epidemiology; Sources of data for health studies and quality of health statistics; Problems with health data sources.

Types of Epidemiologic Research: Experiments, Quasi experiments and observational studies; Study types in population health research: Randomized controlled trials, cohort study, case-control study, cross-sectional study, ecological study and before-after study.

Measures: Calculation and interpretation of ratios, proportions, incidence rates, mortality rates, prevalence, and years of potential life lost; Calculation and interpretation of mean, median, mode, ranges, variance, standard deviation, and confidence interval; Relative Risk, odds ratios, relative protection and relative risk reduction, risk difference, number needed to treat, attributable risk, comparison of proportions from several samples, standard error of estimators, Test of hypothesis.

Diagnostic Testing: Positive and Negative Predictive Values, False positive and false negative, Sensitivity, and Specificity.

Validity Considerations: Validity and precision, internal and external validity, direction of bias, sources of bias, selection bias, measurement or information bias; Misclassification; Effects of misclassification error, controls of misclassification error.

Stratified Analysis: Testing for overall association; Mantel-Haenszel estimators and test, confounding, criteria and practical test for confounding (single risk-factor confounding).

Matching: Definition of matching, Types of matching schemes, Advantages and

disadvantages of category matching, R-to-1 matching, Comparison of m matched samples, McNemar test. Combining evidence from four-fold tables, construction and interpretation of some Chi-square tests. Sample size determination in Epidemiologic studies.

Delivery Modes: Contact teaching, group discussion, homework processing and presentation.

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 demographic modeling. 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.

Essential Readings

The following textbooks (latest editions) are recommended:

Core Book

- Armitage, P. & Berry, G. (1987), '*Statistical Methods in Medical Research',* Blackwell Scientific Publications, Oxford.

Recommended Materials

- Beaglehole, R. et al. (1993), *Basic Epidemiology*, WHO, Geneva.
- Fleiss, J. L. (1981), *Statistical Methods for Rates and Proportions,* John Wiley & Sons, New York.
- Greenberg, R. S. et al. (1992), *Medical Epidemiology,* Appleton & Large, Connecticut.

- Fleiss, J. L. (1981), *Statistical Methods for Rates and Proportions,* John Wiley & Sons, New York.
- Greenberg, R. S. et al. (1992), *Medical Epidemiology,* Appleton & Large, Connecticut.

- Last, J. M. (1995), *A Dietionary of Epidemiology,* Oxford University Press, New York.
- MacMohan, B. et al. (1987), *Epidemiologic Methods*, Little Brown & Co., Boston.
- Morton, R. F. & Hebel, J. R. (1990), *A Study Guide to Epidemiology and Biostatistics,* University Park Press, Baltimore.
- Kung-Jong Lui(2004), Statistical Estimation of Epidemiological Risk, John Wiley & Sons.
- Stephen C. Newman, Biostatistical Methods in Epidemiology. John Wiley & Sons

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

Year: Final Year	Code: M-POPS-505	Marks: 100	Credits: 04	Duration: One Year

Title: Population Modeling

Aims of the Course

The aim of this course is to introduce students to the solid knowledge of modeling (single and double species) tools, techniques and underlying principles regarding population issues.

Objectives of the Course

After completing this course, the students should have to

- acquire knowledge regarding sequence, series, transformation (Laplace's and Fourier) and integral equations;
- figure out the conceptual framework of population modeling;
- learn regarding single and double species population models.

Learning Outcomes

A student who successfully completes the course will have

- the ability to understand different population models used in the modern population research and construct new models if required;
- the ability to predict future population and population related issues using appropriate population models.

Contents

Modeling Tools: Sequence, series, Laplace's transformation, Fourier transformation, and integral equations.

Single Species Population Models: Fundamental concept on modeling, exponential model, logistic model, and model with carrying capacity, diabetic models, epidemic model.

Stationary Population Models: Mathematical formulation and physical interpretation of birth, death, and immigration models, general expansion for variance in line arc population models.

Solution Methods: Fundamental matrix solution of two and three species population models, solution techniques for linear and non-linear population models, stationary population model, population stability, and population momentum.

Two Species Population Models: Predator-prey models, competition models, and models of mutualism.

Two Species Non-linear Population Models: Second and third order Lotka-Volterra models (Predator-prey, competition, mutualism).

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 demographic modeling. 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.

Essential Readings

The following textbooks (latest editions) are recommended:

- Frauenthal, J.C., (1980), *Introduction to Population Modeling*, Birkhauser.
- Freedman, H.I., (1987), *Deterministic Mathematical Models in Population Ecology (Pure and applied mathematics)*, 2nd edition, HIFR Consulting.
- Murray, J.D., (2002), *Mathematical Biology: I. An Introduction (Interdisciplinary Applied Mathematics)*, 3rd edition, Springer.
- Maynard-Smith, J., (1978), *Models in Ecology*, CUP Achieve.
- Keyfitz, N. and Caswell, H., (2005), *Applied Mathematical Demography (Statistics for Biology and Health)*, 3rd Edition, Springer.
- Keyfitz, N., (1977), *Introduction to the Mathematics of Population: with Revisions*, Addison-Wesley.

Year: Final Year	Code: M-POPS-506	Marks: 100	Credits: 04	Duration: One Year

Title: Econometric Method

Aims of the Course

The course is suitable for students with minimum knowledge regarding Matrix algebra, calculus and statistical inference. The aim of this course is to equip the students with the necessary skills, including both the acquisition of habits of thought and knowledge of the techniques of modern econometrics, required for applied research in any branch of knowledge.

Objectives of the Course

After completing this course, the students should have to

- to deepen and broaden the student's knowledge and understanding of material needed for empirical quantitative analysis of different data relevant to different issues;
- to cover the theory and practice of modern econometrics at a level appropriate for a Population Science and HRD graduate, emphasizing application in order to carry out good quality applied research with confidence;
- to develop the critical insight to appraise econometric results obtained by other researchers and provide ability to use useful computer packages/programs (say, e.g., R, SPSS etc) in an effective manner.

Learning Outcomes

A student who successfully completes the course will have

- the students will have developed the necessary skills needed for empirical research using modern econometrics techniques in addressing various contemporary issues;
- through their computer based assignments they will be also trained in conducting research using primary/secondary data;
- the students will deepen their other transferable skills such as, written communication, teamwork, numeracy; computer literacy, problem solving, and analytical skills.

Contents

General Linear Model, Structural Change and Dummy Variables: Concepts of regression analysis involving estimation process. Detection of outliers, concept of level shifts, high leverage points and influential observations; Study on structural change, seasonal adjustment and estimation of parameters using dummy variables.

Heteroscedasticity: Concepts of homoscedastic and heteroscedastic errors in linear models. Tests of heteroscedasticity;, Generalized least square methods, estimation of parameters and their properties.

Autocorrelation: Concepts of autocorrelation and serial correlation. Detection and estimation of autocorrelation, estimation of parameters in case of auto correlated errors terms in the model.

Multicollinearity: Nature of Multicollinearity. Estimation in the presence of perfect Multicollinearity. Estimation in the presence of "High" but "Imprefect" multicollinearity. Consequences of multicollinearity. Detection of multicollinearity. Remedial measures of multicollinearity.

Specification Errors: Concepts on errors in variables, errors in equation, and specification errors; Types of specification errors; Consequences of specification errors and test of specification errors. Errors of measurement, estimation methods for the above cases and the

properties of estimators.

Lagged Variables: Concepts and sources of lagged variables lag operator mean and median lag, the Kyock approach, adaptive expectations and partial adjustment. Estimation procedure with Almon lags and Kyock scheme, estimation with lagged dependent variables.

Time Series Analysis: Concept of time series. Overview of basic time series models: AR, ARCH, GARCH, GJR-GARCH and EGARCH.

Delivery Modes: Contact teaching, group discussion, homework processing and presentation.

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 demographic modeling. 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.

Essential Readings

The following textbooks (latest editions) are recommended:

Introductory Book

- Cohen, Y. and Cohen J.Y., (2008), 'Statistics *and Data with R: An Applied Approach through Examples*', John Wiley & Sons.
- Johnson, R.A. and Bhattacharyya, G.K., (2010), '*Statistics: Principles and Methods*', Sixth Edition, John Wiley & Sons, Inc.
- Kerns, G.J., (2010), '*Introduction to Probability and Statistics*', Free Software Foundation.
- Rumsey, D., (2009), '*Statistics II for Dummies*', Wiley Publishing, Inc.
- Ryan, M., (2005), '*Calculus Workbook for Dummies*', Wiley Publishing, Inc.
- Weisberg, S., (2010), '*Computing Primer for Applied Linear Regression, Third Edition Using R and SPlus*', University of Minnesota.

Core Books

- Baltagi, B.H., (2011), 'Econometrics', Fifth Edition, Springer.
- Greene, W.H., (2003), '*Econometrics Analysis*', Fifth Edition, Pearson Education, Inc.
- Gujarati, D., (2004), '*Basic Econometrics*', Fourth Edition, The McGraw−Hill.
- Hamilton, J.D., (1994), "*Time Series Analysis*, Princeton University Press.
- Maddala, G.S., (1992), '*Introduction to Econometrics*", Maxwell Macmillan Canada, Inc.

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

- Rao, C.R., and Toutenburg, H., (1995), '*Liner Models: Least Squares and Alternatives*', Second Edition, Springer.

Year: Final Year	Code: M-POPS-507	Marks: 100	Credits: 04	Duration: One Year

Title: Human Growth and Development

Aims of the Course

The aim of this course is to introduce students to the interrelationship among physical, emotional and demographical factors of growth and development throughout human life. This course also aims to offer sufficient knowledge regarding human growth modeling.

Objectives of the Course

After completing this course, the students should have to

- acquire proficient knowledge concerning concepts, terms and status of the growth and development process;
- understand the ways how human growth and development transpire and evaluate;
- learn how to examine developmental symptoms throughout the lifecycle and how to handle factors liable for risk commutation for growth and development at each stage of the lifespan.

Learning Outcomes

A student who successfully completes the course will have

- increased literacy and numeracy skills required to solve complex, real-world problems associated with their job, career/technical content area and improve their thinking and reasoning skills;
- the ability to appraise symptoms of healthy growth and physical development and settle on factors those are aid or harmful for physical growth and development;
- the ability to understand, explain and conduct genuine research in human development and growth with confidence.

Contents

Growth and Development: Basic concepts, stages in child growth, early childhood, mid-childhood, late childhood, adolescence, prenatal and postnatal growth, somatic growth.

Morphometry: Stature, weight, BMI, vital capacity, strength, sitting-height, chest circumference, Bouchard's index. Livi's weight-height index. Rohrer's body build index, index of morphological equilibrium. Grid method and auxogram. Manouvrier's index of body build. Cormic index. Pirguet's index of body build, Demeny's vital index, Speh's vital index, Bruugsch's chest-stature index, Pignet's coefficient of robusticity.

Craniometry and Osteometry: Planes of orientation, cranial landmarks, craniometric indices and cranial capacity. Osteometry, index of the body, foramen and Baudoin's sexual index vertebral index and Cunningham's index. Masurement of Sacrum and long bones.

Physical Maturation and Development: Skeletal maturation, sexual maturation, age at menarche body composition and nutritional status timing and sequence of adolescent events, development of hearing ability.

Modeling for Human Growth: Biological variables and its secular trends, the Gompertz and logistic growth models, Jenss model, Count model, double logistic model, PB models, ICP model, Reed models, SSC model, JPPS model, JPA-1 and JPA-2 models, modified ICP model, BTT model and Kernel's (non-parametric) model, growth variations due to genetics and nutrition. Twin growth, heritability of growth.

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 demographic modeling. 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.

Essential Readings

The following textbooks (latest editions) are recommended:

- Adams, G.R. and Berzonsky, M. (ed.), (2005), *Blackwell Handbook of Adolescence*, Wiley-Blackwell.
- Aheme, W.A. and Dunill, M.S., (1982), *Morphometry*, Edward Arnold.
- Carter, J.E.L. and Heath, B.H., (1990), *Somatotyping- Development and Applications*, Cambridge University Press.
- Falkner, F. and Tanner J.M., (1979), *Human Growth: Postnatal Growth*, Plenum Press.
- Falkner, F. and Tanner J.M., (1979), *Human Growth: Principles and Prenatal Growth*, Plenum Press.
- Johnston, F.E., edn), (1980), *Human Physical Growth and Maturation: Methodologies and Factors (NATO Advanced Study Institutes Series)*, Springer.
- Roche, A.F., (1992), *Growth, Maturation, and Body Composition: The Fels Longitudinal Study 1929-1991*, Cambridge University Press.
- Shephard, R.J., (1991), Body Composition in Biological Anthropology (Cambridge Studies in Biological and Evolutionary Anthropology), Cambridge University Press.
- Stevens, J.P., (2012), Applied Multivariate Statistics for the Social Scienes, 5th edition, Taylor & Francis.

Year: Final Year	Code: M-POPS-508	Marks: 100	Credits: 04	Duration: One Year

Title: Population, Environment and Sustainable Development

Aims of the Course

The aim of the course is to equip students to advanced knowledge regarding population, environment and sustainable development with frameworks, indicators, models, policies and programs to eliminate problems associated with environment in order to prolong sustainable development.

Objectives of the Course

After completing this course, the students should have to

- learn basic concepts regarding population, environment, sustainable environment and sustainable development;
- learn environmental models, policies and programs to evaluate environmental impact on human life;
- be equipped with sufficient knowledge concerning indicators, frameworks and structures of development and sustainable development to cover the theory and practice of environmental planning and management.

Learning Outcomes

A student who successfully completes the course will have

- understood the relationships among population, environment and sustainable development;
- the ability to explain the linkages among population, resource and environment to ensure sustainable development;
- ability to provide appropriate environmental policies and programs to overcome environmental problems.

Contents

Introduction: Population and development interrelationship; frameworks for analysis; Framework for development of environment and development indicators;

Ecology and Ecological Process: Concept of ecology, ecological process and human ecological process; population and environment in ecological process; environmental process; spatial structure; environmental degradation and pollution;

Sustainable Development: Concepts of sustainable development; indicators and criteria of sustainable development; Framework of sustainable development; elements of sustainable development and its critism.

Sustainable Environment: Concepts of Sustainable environment; Population and development modeling; Population, resource and environment models; Environment planning and management; Environment policies and programs;

Environmental Problem: Population growth, development activities and environment problem in Bangladesh.

Delivery Modes: Contact teaching, group discussion, homework processing and presentation.

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 demographic modeling. 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.

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. **8**.
- Ehrlich, P.R., Holden, J.P. and Ehrlich, A.H., (1978), *Ecoscience: Population, Resource, Environment*, 3rd edition, W.H. Freeman & Co.
- Gould, W.T.S., (2009), *Population and Development*, Routledge.
- Nag, P., Kumar, C. S. and Sengupta, S. (ed.), (2001), *Environment, Population and Development*, Concept Publishing Company.
- Turk, J. and Turk, A., (1988), *Environmental Science*, Saunders College Publishing.
- UN (1983), Manual-X, *Indirect Techniques for Demographic Estimation, Department of International Economic and Social Affairs*, Population Studies, No. **81**.
- UN (1988), *Frameworks for Population and Development Integration: ESCAP regional perspectives, Asian population studies series* Vol.**1**, Economic and Social Commission for Asia and the Pacific, United Nations.
- 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.
- United Nations Development Prpgramme (UNDP), *Human Development Reports*, Series: 1990-2013, Communications Development Incorporated, Washington DC.

M-POPS-509
Practical
(Full Marks=150; Total Time: 30 Hours)

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.