Indira Gandhi National Open University
School of Sciences

MSTL-001
Basic Statistics Lab

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BASIC STATISTICS LAB

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Statistics is the science of collecting, organising and interpreting data. In real life, we come across a large amount of data and it is very difficult and time consuming to handle and analyse it manually. We can make use of the software MS Excel 2007, an application of Microsoft Office 2007 that is easily available, to handle and analyse data. In this lab course, you will learn how to use Excel 2007 to apply various statistical data analysis tools which you have already learnt in the five theory courses, namely, MST-001 (Foundation in Mathematics and Statistics), MST-002 (Descriptive Statistics), MST-003 (Probability Theory), MST-004 (Statistical Inference) and MST-005 (Statistical Techniques).

This course describes some basic statistical tools for operations that explore and draw conclusions from data using Excel 2007. This lab course is designed in MS Excel 2007 for Windows.

The course is divided into four parts comprising 12 lab sessions.

Part A (Representation of Data) comprises five sessions. The first session of Part A will make you familiar with MS Excel 2007. In the remaining sessions of this part, you will learn how to classify or arrange raw data in tabular forms and represent it diagrammatically or graphically using Excel 2007.

Part B (Descriptive Statistics) comprising three sessions will impart practical skills of using Excel 2007 for computing the measures of central tendency as well as dispersion. You will learn how to determine skewness and kurtosis, which provide an idea about the symmetry and flatness of the distribution in Excel 2007. You will also be able to determine the linear relationship between two or more variables by computing correlation coefficients using Excel.

Part C (Statistical Inference) comprises two sessions which will enable you to develop practical skills for applying different parametric tests such as Z, t, chi-square and F tests for one and two samples.

Part D (Analysis of Variance and Design of Experiments) comprises two sessions in which you will learn how to apply one-way and two-way analysis of Variance (ANOVA). You will also use the ANOVA technique to deal with completely randomised design, randomised block design and Latin square design using Excel 2007. In this session, you will also learn how to use the ***Data Analysis ToolPak*** in Excel for applying ANOVA.

This lab course will help you develop practical skills of analysing data using MS Excel 2007. You will learn how to use the basic features of the ***Functions*** and ***Data Analysis ToolPak*** in Excel 2007 for solving problems based on the theory courses MST-001 to MST-005. This will make it easier for you to explore Excel 2007 further on your own and apply it in your work.

Study Guide

This lab course is of 2 credits. It means that it requires a total of 60 hours to complete the 12 sessions prescribed in the course. In each lab session, some activities are also given for practice. The results of each lab session would be evaluated as a part of your continuous assessment. At the end of each lab session, exercises for continuous assessment are also given which would be evaluated as well as graded. Thirty per cent (30%) weightage is given to continuous assessment. The term-end examination carries seventy per cent (70%) weightage. It will be held on a common date for all students at designated examination centres. The date will be notified earlier.

We advise you to complete the courses MST-001 to MST-005 of the programme before you start doing this lab course. To derive maximum benefit from this lab course, you are advised to revise all prerequisite write-ups carefully so that you are well prepared to do the practicals. You should know all formulae and procedures used in each lab session and follow all instructions given therein to acquire competence and skills in using MS Excel 2007 for applications of statistics.

You may like to follow the instructions given in each laboratory session and solve the exercises on your own if you have a computer with MS Excel 2007 on it. **You may like to do the steps in each session and exercises for continuous assessment given therein on your own. In that case, you are advised to take prior permission from the Programme and Course Coordinators giving due justification, and keep in touch with them at designated times.** You are also advised to submit your work to the designated Counsellor for continuous assessment and appear in the term-end examination on the pre-notified date. If you wish to learn these skills at your Study Centre under the guidance of the Counsellor, you will be required to be present in the Lab for 6 days (8 hours each day). The schedule will be decided by the Study Centre and intimated to you in advance.

You must carry the printed course materials of the theory courses MST-001 to MST-005 along with this lab course (MSTL-001) to your Study Centre while doing the lab course so that you can refer to them in case you have any doubts. Since the exercises of this course are computer based, **a working knowledge of computers is a prerequisite**. You must complete each exercise before going to the next one as the skills you learn in any exercise are essential for the subsequent exercises. Hence, you must complete all lab sessions sequentially to complete this lab course successfully.

Note that the following convention is used in the exercises:

Name of the menu/command – in ***bold, italics and blue colour***

Name of the keyboard command – in ***bold, italics and green colour***

Name of Excel sheet – in "**bold and inverted commas**"

Formula or text to be typed in a cell of Excel sheet – in "inverted commas"

The abbreviations being used are the same as for theory courses viz.

Fig. for Figure,

Figs. for Figures,

Sec. for Section and Sub-section, and

Secs. for Sections and Sub-sections.

For performing the exercises in this course, we advise you to create a folder named "**Basic Statistics Lab**" on your computer. Use a new Excel file for each lab session and name each of these files as, e.g., LS1, LS2, …, LS12 so that it becomes easy for you to manage the files you are dealing with.

For managing the problems, activities and continuous assessment given in each lab session, it would be a good idea to use a separate sheet in each Excel file and name them based on the activities and exercises. Then it will be easy for you to locate the files and sheets later.

Laboratory Record Book

An important part of scientific training is to maintain a complete and up to date record of the lab work. You need to prepare and submit a lab record book for writing and reporting the work you have carried out in each lab session. The record book should contain alternate pages of ruled and un-ruled pages. Buy a practical notebook for this purpose.

You are advised to prepare the page (such as title, exercise numbers, etc.) for recording the lab exercises before beginning a lab session. **For each session**, you should **write down the title of the session and the date** along with the interpretation of the results obtained and paste the final screenshot of the Excel sheet. What you need to submit and write in the record book is given at the end of each lab session.

You should record your work for each lab session in your record book in the following sections:

- Problem given
- Formulae and Procedures used for the problem
- Necessary Screenshots and Charts of the results
- Interpretation

Submission of Your Lab Record for Evaluation

You need to submit the lab record book to the Counsellor at the Study Centre for continuous assessment and grading. Marks will be allocated for successful completion of each exercise, interpretation of the results and screenshots of the final output pasted in the record book in a proper manner as directed above.

Activity

Some activities are given at the end of problems in each lab session. These activities have two purposes: To give you practice in the steps explained in the session and to make you think and explore the functions and tools available in Excel 2007 on your own. So, do complete all activities yourself.

We hope that after studying this lab course and performing the activities and exercises given for continuous assessment, you will acquire the basic practical skills to use MS Excel 2007 and be able to apply them in your work. As far as possible, try to work independently. We hope that you enjoy doing the practicals given in this Basic Statistics Lab course.

We wish you the best in this endeavour.