General Introduction

This manual is designed to guide you through the module so that, even if you have never seen some of the material before, you should be able to grasp the concepts presented. It will give you both the confidence and statistical skills necessary to research and explore these concepts further. The manual provides much of the core material to be covered in each unit and gives a large number of examples. It also provides you with online web resources that you can use if you need further explanation.

You will have the opportunity to practise in your own time and to see how the material can be applied in different situations. Make sure you attempt all the practice exercises and that you have a good understanding before you move on to the next unit. At first, you may find some of the problems difficult and the solution will not always be obvious. The problems are designed to develop your reasoning, statistical thinking, and problem-solving skills and to encourage you to seek out solutions using other resources.

There are a number of essay-type questions. You will not be given solutions for these questions. The essay-type questions are in Units 1 and 2. One of these essays will appear on the final exam. You are expected to use not only this manual, but also the core reading material, library resources, and the internet to write these essays.

Apart from learning the material presented in this manual, you will be expected to do some research on your own. A core text is assigned reading for this module, and the module also includes web links to suitable resources. You are expected to use these resources to develop your knowledge further.

You will also be expected to attend a number of tutorial sessions. At these sessions, you will meet your tutor and you can get help with any problems that you may be experiencing. There is an online discussion board which will allow you to interact with your tutor and your fellow students.

If, at any stage, you feel that you are getting lost or you feel that there may be more gaps in your knowledge than those catered for in the course notes, bring this to the attention of your tutor either by email or at the tutorial sessions so that your concerns can be addressed before they become a problem.
Aim of the Module

The aim of this module is to introduce you to the concept of Quality Science, to give you a broad understanding of the Six Sigma methodology, and to give you a broad foundation in the statistical methods and statistical thinking that form the basis of the Six Sigma process. You will learn to build on this foundation so that you have the confidence and statistical skills necessary to visualise and interpret data.

In addition, the module should help you develop a number of Professional Transferable Skills (PTS), such as critical thinking, problem solving, and written communication.

Wherever you see the PTS symbol $\text{PTS}$ in your course book, this indicates that the activity you are undertaking to some extent develops the specific skill referred to at that point. In particular, the SAQs all involve problem solving and critical thinking.

This module also helps you develop a working knowledge of the statistical package Minitab. It provides examples that illustrate the use of Minitab. You will be expected to apply the knowledge and skills learned from the various examples.

Resources

The core textbook is:


This text contains a CD that provides access to additional web resources, examples, and question banks that will be of great assistance and can be used to complement this manual.

Web Resources

http://www.tutorialspoint.com/six_sigm a/index.htm
http://davidmlane.com/ hyperstat/
http://www.analyzemath.com/statistics.html
http://www.dwmbeancounter.com/statistics.html
Module Structure

Each unit starts with a set of learning outcomes and most units end with a number of self-assessment questions designed to enable you to assess your own progress.

When you have finished studying a unit, test yourself against each learning outcome for the unit. If you cannot perform the tasks set out in the learning outcomes, go back over the unit and, if necessary, use the online web resources and the core text until you have achieved all of the learning outcomes.

In Units 1 and 2, there are essay-type questions at the end of the units. You should research the answers to these questions and keep these in your journal for revision. Remember that part of the exam is taken from these questions.

You will also be given self-assessment questions at the end of Units 3 to 16. Some of these will be highlighted as exam-type questions. You should first attempt these without looking at the suggested solution. You should then compare your answer to the suggested solution to check if you are answering the question to the required standard.

Overview of Module Content

Unit 1: This unit gives an overview of the history and development of Quality Science. At the end of the unit, there is an essay-type question that you must complete in preparation for the exam. This essay will require some research.

Unit 2: This unit introduces the Six Sigma methodology and identifies the statistical tools used in the Six Sigma process. In the remaining units, you will learn the statistical methods upon which these tools are based. There are two essay-type questions at the end of this unit that will require further research.

Units 3 – 8 cover the first three stages of the Six Sigma process: Define, Measure, and Analyse. The material will focus on the type of statistical methods and thinking required to meet the demands of using these three tools.

Units 9 – 16 focus on improving and controlling your process using more advanced statistical methods.

The focus throughout this module will be on developing your thought processes so that you can visualise and interpret data in an appropriate manner.

Throughout the module, you will also learn to use the statistics package Minitab to generate graphs and test results.
Assessment

The course will be assessed using:

- 3 assignments (10% each)
- A project (20%)
- An end of semester examination (50%)

You must achieve at least a pass for each part of the assessment.

Past papers are not provided for this module. Instead, you will be provided with a separate set of long revision questions similar to those given in the self-assessment sections at the end of the units. These will complement the short questions and essay-type questions already provided in the manual. The exam will be taken from these questions. The exam structure will be explained in detail in the first tutorial.