Government
Statistical Service

Office for
National Statistics

GSS Statistical
Training Programme

September 2015 to July 2016

Contents

Welcome

The Statistical Training Service aims to provide a flexible learning programme to support you in strengthening and updating your professional skills and knowledge. We strive to make studying an enjoyable, rewarding and worthwhile experience.

The GSS Statistical Training programme delivers training in the main methods used in Official Statistics. The courses provide a useful overview of the statistical techniques used by statisticians and provide information on how and why to choose the most appropriate methodology.

How to apply

• Visit the GSS website for an application form:
https://gss.civilservice.gov.uk/people-and-careers-2/courses-events/

• Contact us by emailing:
statistical.training.enquiries@ons.gsi.gov.uk

Statistical training short courses

Entry requirements

L1 LEVEL 1

No prior knowledge required. The course provides an introduction and understanding of the subject.

L2 LEVEL 2

A degree in mathematics or statistics, or a good working knowledge of the subject.

When to apply

There is no formal closing date for applications, but early application is recommended to secure your place on a course.

Quality and statistics

L1 **SA** **N** **T**

Aims

To introduce some of the quality considerations that are appropriate in the production of Official Statistics.

Objectives

By the end of the course, participants will gain:

- an understanding of the importance of quality through aligning with specific aspects of the Code of Practice and sharing recent guidance from the GSS Statistical Policy and Standards Committee

- knowledge in the practical application of quality and how to implement it

- an overview of relevant guidance and tools

Duration: 1 day

Introduction to questionnaire design and testing

L1 **SA** **N** **T**

Aims

To introduce participants to data collection methodology and how it is applied to the survey development process.

Objectives

By the end of the course, the participant will be able to understand and identify:

- different sources of non-sampling error, focusing on measurement error and non-response error

- different modes of data collection including mixed modes

- questionnaire and question design principles, including different types of questions, sources of measurement error, including mode effects, and potential ways to mitigate them

- qualitative and quantitative methods for developing and testing questions, including expert review and cognitive question testing

Duration: 1 day

Locations

The courses will run at the Office for National Statistics in Newport, Titchfield and London.

Each location is represented by the colour key seen below.

N NEWPORT

T TITCHFIELD

L LONDON

Costs

N **T**

0.5 day	£75
1 day	£115
1.5 day	£165
2 day	£200

L

0.5 day	£80
1 day	£125
1.5 day	£175
2 day	£210

Sample design and estimation (social)

L1 **SA** **N**

Aims

To explore aspects of sampling and estimation that are particularly applicable to social (household) surveys.

Objectives

By the end of the course, participants will be able to understand:

- the use of sampling frames
- different data collection modes
- sample design and different sampling methods
- estimation of simple statistics under various designs and there associated standard errors and confidence intervals
- the use of weights

Duration: 2 days

Sample design and estimation (business)

L1 **SA** **N**

Aims

To introduce participants to sampling frames, sample design, calibration weights, outliers and the estimation process, particularly application to business surveys.

Objectives

By the end of the course, participants will be able to understand:

- the importance of creating and maintaining good sampling frames
- the need for a sampling selection method that can provide good quality and representative results
- how sampling is done for business surveys in ONS (use of the IDBR)
- the main estimators of population totals used in ONS business surveys
- design and calibration weights
- under what circumstances each estimator is appropriate and be aware of different methods for assessing the accuracy of estimators
- what outliers are and why they occur
- some methods of outlier detection and treatment strategies
- the Winsorisation method

Duration: 2 days

Sample design and estimation (social)

L2 **N**

Aims

To explore more complex aspects of sampling and estimation that are particularly applicable to social (household) surveys.

Objectives

By the end of the course, through practical application of the methods, participants will be able to understand:

- the principles and practicalities behind sampling and estimation used within Official Statistics
- when to use different sampling strategies, with particular emphasis on multi-stage sampling
- how sample data can be used to estimate parameters of interest, with emphasis on weighting strategies that account for non-response and allow calibration to known population totals
- how to assess the quality of sample estimates, with attention paid to sampling errors and the use of design factors

Duration: 1 day

Sample design and estimation (business)

L2 **N**

Aims

To explore more complex aspects of sampling and estimation that are particularly applicable to business (or establishment) surveys.

Objectives

By the end of the course, through practical application of the methods participants will understand:

- the principles and concepts behind sampling and estimation used within Official Statistics
- when to use different sampling strategies, with particular emphasis on stratification
- how sample data can be used to estimate parameters of interest, with emphasis on estimation methods that make best use of other available information
- how to assess the quality of sample estimates, including the impact of the sample design and estimator

Duration: 1 day

Small area estimation

L2 **T**

Aims

To introduce participants to:

- the methodology applied to small area estimates
- when and how small area estimation methods should be applied

Objectives

By the end of the course, participants will be able to:

- understand the concepts and principles of a variety of methods
- be aware of which methods are most commonly used and why
- observe how different methods are applied
- understand which techniques are used in Official Statistics
- combine and model survey data with other datasets

Duration: 1 day

Editing and imputation

L1 SA N

Aims

To introduce participants to:

- the editing process of detecting and correcting errors in business survey response data
- the imputation process of estimating for non-response in business surveys

Objectives

By the end of the course, participants will be able to understand:

- the vital importance of editing and imputation
- how editing and imputation methods are implemented in practice

Duration: 1 day

Statistical disclosure control

L1 SA N T

Aims

To introduce participants to:

- potential disclosure risks
- available statistical disclosure methods

Objectives

By the end of the course, participants will be able to understand:

- what is meant by statistical disclosure risk and statistical disclosure control
- why there is a need to protect data against disclosure
- how to recognise situations that bring about statistical disclosure risk
- the disclosure techniques and tools that are used to protect data
- the GSS standards for disclosure control

Duration: 1 day

Geography

L1 SA T

Aims
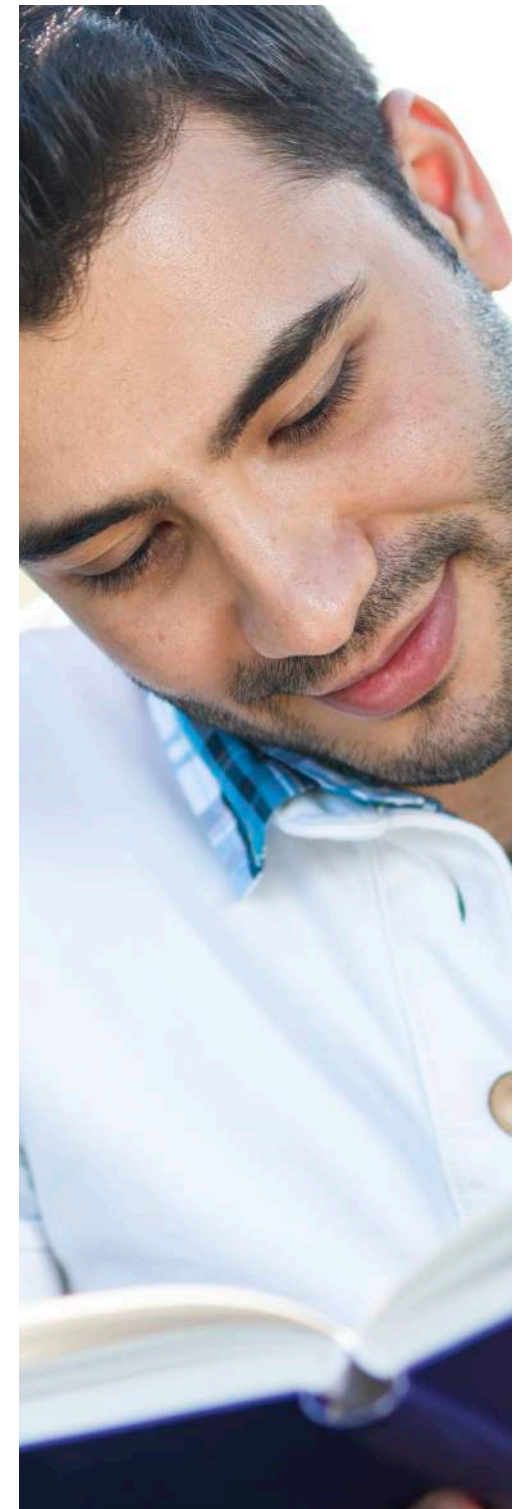
To introduce participants to:

- the importance and use of geography in the production of statistics
- the generic elements of geographic knowledge, understanding and skills needed for analysis and research

Objectives

By the end of the course, participants will be able to understand:

- the complexity of statistical geography in the UK
- basic spatial statistical techniques
- how to interpret statistical maps
- the application of the GSS Geography Policy for Official Statistics
- ONS's Open Geography portal, resources and tools

Duration: 1 day

Seasonal adjustment

`L1` `N`

Aims

To give participants:

- an introduction to the basic theory behind seasonal adjustment and the seasonal adjustment process
- an overview of the US Census Bureau's software X-13ARIMA-SEATS (GSS recommended software for seasonal adjustment)

Objectives

By the end of the course, through a mixture of theory and the practical application of X-13ARIMA-SEATS, course participants will gain an understanding of:

- the basic theory underpinning seasonal adjustment
- issues to consider when publishing seasonally adjusted estimates
- how to perform basic seasonal adjustment
- how to analyse your own time series data

Duration: 1 day

Seasonal adjustment

`L2` `SA` `N`

Aims

To give participants:

- an introduction to more advanced theory behind seasonal adjustment and the seasonal adjustment process (building on the Level 1 course)
- the ability to use the US Census Bureau's software X-13ARIMA-SEATS (GSS recommended software for seasonal adjustment)

Objectives

By the end of the course, through a mixture of theory and the practical application of X-13ARIMA-SEATS, course participants will:

- gain an indepth understanding of the theory underpinning seasonal adjustment (building on the Level 1 course)
- be able to perform more advanced seasonal adjustment
- be able to analyse their own time series

Duration: 2 days
(Level 1 course is a pre-requisite)

ANOVA (ANalysis Of VAriation)

`L2` `N` `T` `L`

Aims

To give participants a refresher in the application and interpretation of ANOVA.

Objectives

By the end of this course, participants will be able to:

- revise the use of ANOVA and explore differences in means across factors
- consider the key assumptions behind ANOVA
- interpret basic ANOVA output
- discuss additional analyses that can help the understanding of results
- introduce extensions to ANCOVA and MANOVA

Duration: 0.5 day
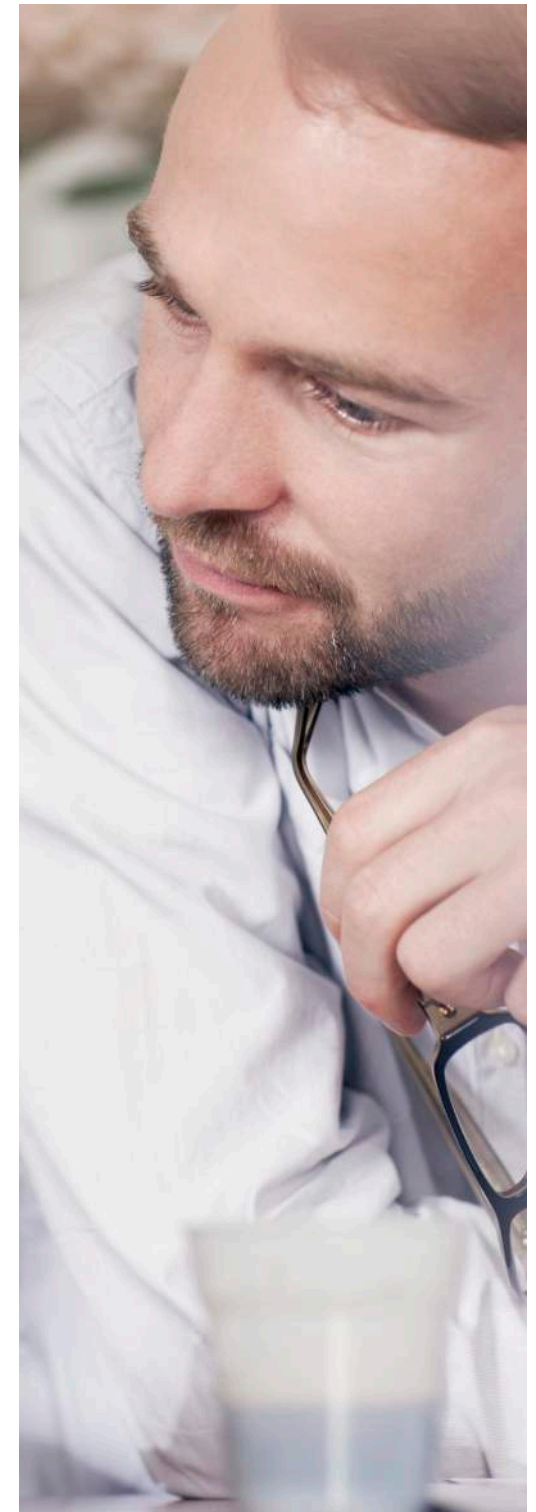
Index numbers

L1 **SA** **N**

Aims

To introduce participants to the theory behind index numbers and the techniques used in practice.

Objectives

By the end of the course, participants will be able to understand:

- the uses of index numbers
- the definitions of value and value share
- Laspeyres and Paasche indices
- how to choose an index formula
- the definitions of deflations and referencing

Duration: 1 day

Index numbers

L2 **N**

Aims

To introduce participants to:

- the theoretical background to index numbers
- index number techniques used in practice
- aspects of the Consumer Prices Index (CPI)

Objectives

By the end of the course, participants will be able to understand:

- the definitions of value and value share
- Laspeyres and Paasche indices
- how to choose an index formula
- what domains and aggregation are
- the definitions of deflation, referencing and linking
- the aspects of the Consumer Prices Index (CPI)
- the wider uses of index numbers

Duration: 1.5 days

Hypothesis testing

L2 **N** **T**

Aims

To give participants an overview of hypothesis testing and its application within Official Statistics.

Objectives

By the end of the course, through the use of examples and theory, participants will gain:

- an understanding of the basics of hypothesis testing
- a working knowledge of statistical power
- an overview of more complex hypothesis testing problems and knowledge of how to deal with them

Duration: 1 day

Randomised control trials

L2 **N** **T**

Aims

To introduce participants to the theory behind randomised control trials and to give an introduction to good practice guidelines for their practical application.

Objectives

By the end of the course, through the use of examples and theory, participants will gain an understanding of:

- what randomised control trials are
- how they work
- the benefits and limitations of their application

Duration: 1 day

Simple linear regression

L1 N T L

Aims

To give participants a refresher in the application and interpretation of simple linear regression.

Objectives

By the end of the course, participants will be able to:

- revise the use of simple linear regression
- assess the fit of a model
- test and interpret an estimated model
- discuss the use of residual analysis to validate model assumptions
- transform data to improve model fit

Duration: 0.5 day

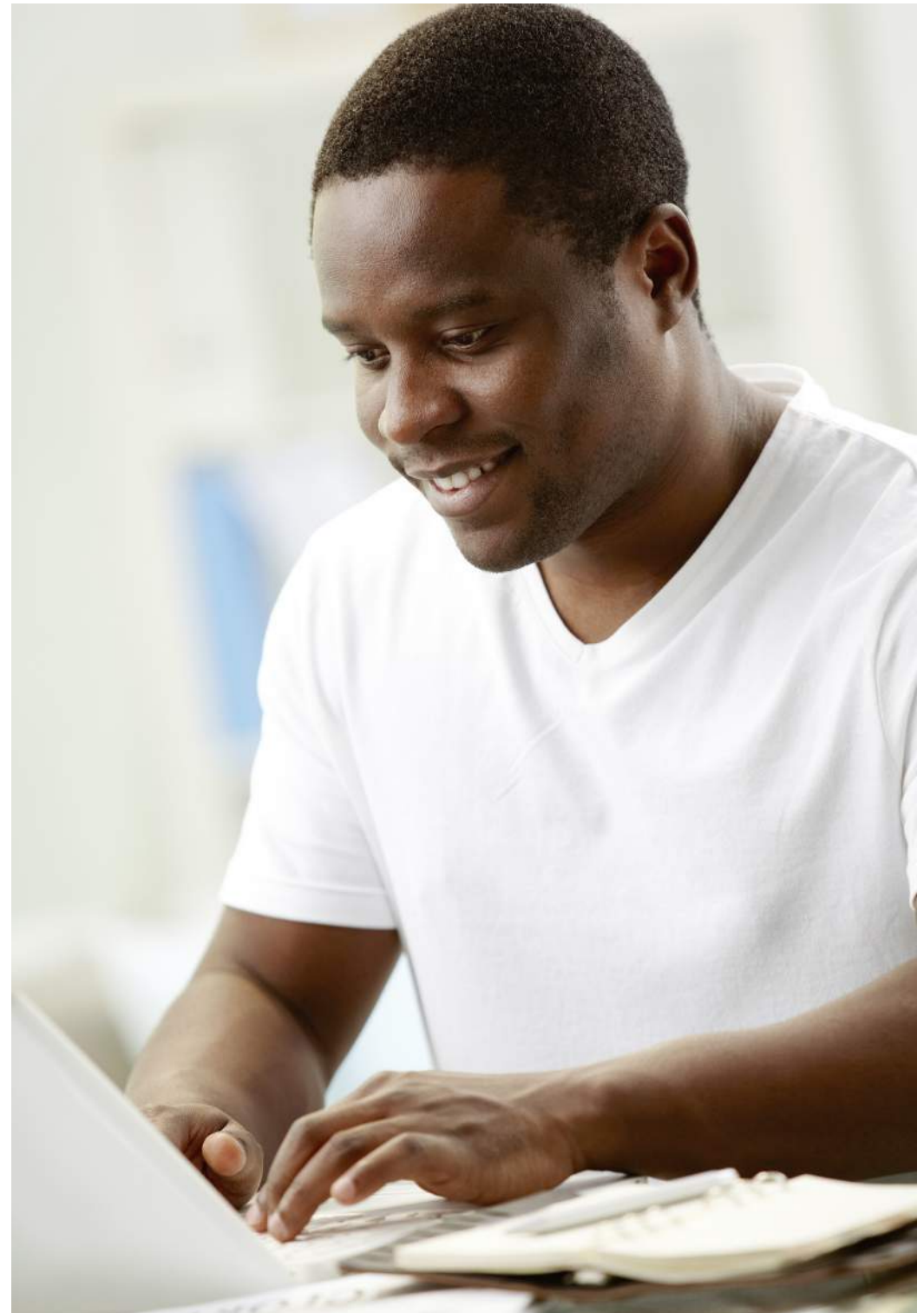## Multiple linear regression

L2 N T L

Aims

To give participants a refresher in the application and interpretation of multiple linear regression.

Objectives

By the end of the course, participants will be able to:

- understand the approaches to building a multiple regression model, including stepwise procedures, handling categorical variables, non-linear relationships and interactions
- select and interpret suitable models
- discuss the different roles of modelling

Duration: 0.5 day

Introduction to logistic regression

L1 **N** **T** **L**

Aims

To give participants a refresher in the application and interpretation of logistic regression.

Objectives

By the end of the course, participants will be able to:

- understand how to use logistic regression
- assess model fit and interpretation of model parameters using odds ratios, predicted probabilities, and marginal effects
- discuss alternative link functions, for example probit

Duration: 0.5 day

Generalised linear models (GLMs)

L2 **N** **T** **L**

Aims

To give participants a refresher in the application and interpretation of GLMs.

Objectives

By the end of the course, participants will be able to:

- understand the GLM framework
- introduce specific models for different outcome variables, including count variables, ordinal variables and nominal variables
- interpret model parameters and assess model fit

Duration: 1 day

Administrative data

L1 **SA** **N** **T**

Aims

To consider the differences between survey and administrative data by:

- highlighting some of the challenges when linking different datasets
- providing an insight in to the legal issues around acquiring administrative data

Objectives

By the end of the course, participants will be able to:

- explain what is meant by the term administrative data
- describe the benefits and limitations of using administrative data
- explain the advantages of using administrative data in the production of social and demographic statistics
- describe the principles behind matching and linking microdata

Duration: 1 day

Record linkage

L1 **SA** **T** **L**

Aims

To understand how records from different sets of data can be linked and the applications of this.

Objectives

By the end of the course, through practical application of particular matching methods, participants will be able to understand:

- why record linkage is not straightforward
- the desirable qualities of matching variables
- how to prepare the datasets before matching
- different types of matching methods
- how to deal with matching very large datasets
- how to evaluate the quality of your matches
- how to deal with matching encrypted datasets

Duration: 1 day

Data visualisation

`L1` `N` `T` `L`

Aims

To introduce the basic principles of data visualisation and their application in designing functional effective static graphics for a wide audience.

Objectives

By the end of the course, through use of examples and theory, participants will be able to understand:

- the fundamentals of effective data graphics at a basic level (for example, in tables and charts)
- how different charts can be used to highlight particular data relationships
- the wider potential for data visualisation to support exploration and narrative
- emerging trends in data visualisation, their relevance and application

Duration: 1 day

Communicating statistics

`L1` `SA` `N` `T`

Aims

To introduce participants to:

- the importance of user engagement, good commentary and clear data visualisation
- improving how we communicate our statistics to a range of users
- a set of useful tools that can be used to communicate statistics effectively

Objectives

By the end of the course, participants will be able to understand:

- why user engagement is important
- effective ways of identifying and engaging with users
- how social media can be effective in engaging with users
- best practice for report writing
- importance of data visualisation
- how to conduct a peer review

Duration: 1 day

Introduction to National Accounts

`L1` `SA` `N`

Aims

To introduce participants to:

- the different approaches to measuring Gross Domestic Product (GDP)
- the Balance of Payments
- the division of the economy into sectors
- balancing theory and practise

Objectives

By the end of the course, participants will be able to:

- describe the three approaches to measuring GDP
- understand what is included in the Balance of Payments
- list the characteristics of the sectors of the UK
- understand why we need to balance
- identify the participants in the economy and the transactions that flow between them

Duration: 1 day
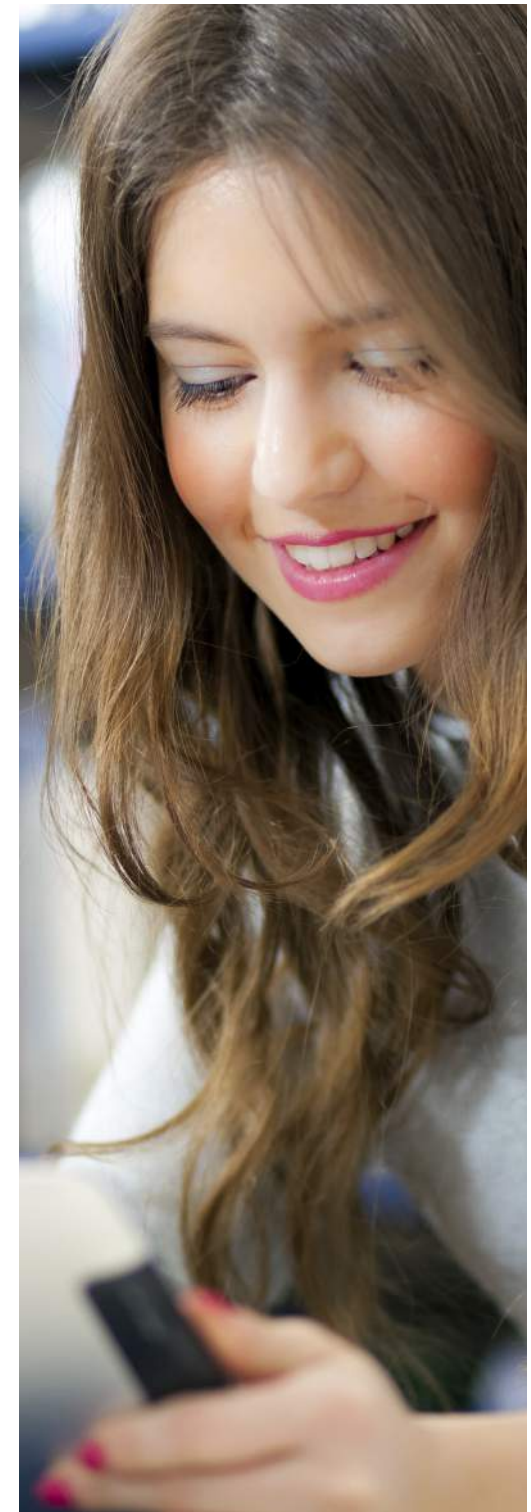
RSS Ordinary Certificate

Duration
1 Year
3 hours per week, Sept to May

Location
Newport, Titchfield,
Distance Learning

Supplier
Statistical Training Service

Pre-requisite
GCSE or O Level maths, or
equivalent

Cost
Classroom course £1,165
Distance learning £595

Would you like to develop a better understanding of survey design and processing? Would you like to obtain a recognised qualification?

The RSS Ordinary course covers the basic principles of survey design, analysis and processing in a series of 6 units. (For those with more specific training needs, one-off modules are available on request)

Unit 1

Research methods, data collection and questionnaire design

- understanding the differences between observational and experimental studies
- understanding the origin, use and interpretation of published or administrative data
- understanding what Official Statistics are
- understanding of the different types of surveys
- understanding how to design a simple questionnaire

Unit 2

Sampling frames, methods and errors

- understanding the definitions of a population and a sampling frame
- understanding the differences between random and non-random sampling
- understanding the different methods used to sample
- a guide to the various types of non-sampling errors

Unit 3

Condensing, presenting and summarising data

- condense, present and summarise raw data, frequency data and grouped data

Unit 4

Time series and index numbers

- drawing time charts
- identifying the components of a time series
- choosing the most appropriate model to fit to a time series and how to apply it
- understanding what an index number is and why it is used
- understanding the difference between price and quantity indices
- understanding how to calculate different indices

Unit 5

Regression and correlation

- understanding what regression is and why it is used
- calculating and interpreting the values of the regression line
- drawing scatter diagrams and describing the correlations between variables
- interpreting correlation coefficients

Unit 6

Probability

- understanding the definition of probability
- calculating probabilities
- Understanding the difference between mutually and non-mutually exclusive events and independent and dependent events
- understanding and using Venn and tree diagrams
- calculating and interpreting conditional probabilities

RSS Higher Certificate

Duration
2 Years
2 hours per week, Sept to May

Location
Newport, Distance Learning

Supplier
Statistical Training Service

Pre-requisite
AS Level in Maths or equivalent

Cost
Classroom course £1,465 per year
Distance learning £660 per year

Would you like to be part of the ONS RAS job family or the GSS Statistician Group? Would you like to obtain a recognised qualification?

The RSS Higher course builds upon the basic principles of survey design, analysis and processing, covering more advanced statistical methodology.

Candidates are required to complete 6 modules to attain this qualification. (For those with more specific training needs, one-off modules are available on request).

Modules 1 to 4 are mandatory, 2 options should be chosen from modules 5 to 8. (The Statistical Training Service currently only offers modules 7 and 8 in fulfilment of this requirement)

Year 1 - Module 1

Data collection and interpretation

- summarising and interpreting data
- conducting exploratory analysis
- report writing and interpretation of published data

Year 1 - Module 2

Probability models

- understanding probability and associated definitions
- understanding and using discrete and continuous probability distributions including: Bernoulli, binomial, Poisson, negative binomial and normal

Year 1 - Module 3

Basic statistical methods

- sampling distribution and standard error
- constructing and interpretation of confidence intervals
- hypothesis testing
- non-parametric testing

Year 2 - Module 4

Linear models

- correlation analysis
- design of experiments
- linear regression analysis
- analysis of variance for regression models
- one-way analysis of variance

Year 2 - Module 7

Time series and index numbers

- moving averages, exponential smoothing and ARIMA models
- decomposing a time series
- elementary forecasting
- different types of index numbers and their uses
- deflation, rebasing and chain linking

Year 2 - Module 8

Survey sampling and estimation

- populations and sampling frames
- probability and non-probability sampling methods
- calibration techniques for estimation
- bias/variance trade off

GSS Statistical Training Programme
Course timetable information 2015 to 2016

Please visit our website:
https://gss.civilservice.gov.uk/people-and-careers/courses-and-events/gss-statistical-training-programme/

Professional Development in Official Statistics

Duration
5 days per module

Location
Newport, Southampton

Supplier
Southampton University, ONS

Pre-requisite
Degree in Maths or Statistics or equivalent, and a good working knowledge of the subject

Cost
Varies

Professional Development in Official Statistics is a modular programme of short courses that the University of Southampton deliver on behalf of and in collaboration with the Office for National Statistics.

The programme of study is tailored specifically to meet the needs of professional statisticians working within the field of Official Statistics. The programme has been designed to facilitate part-time study by delivering each unit within a 1 week period. The nature of the programme enables students to draw on experiences from, and apply new knowledge and techniques to, their work environment as they study.

Many of the skills taught on the programme, such as survey methods and data analysis, are also in great demand by employers outside government and it is intended that the programme provides relevant training for professional positions in a wide range of organisations conducting large-scale statistical work.

The modular structure of the MSc programme is designed to enable you to tailor your individual study scheme to other commitments.

The successful completion of 6 instructional units leads to the award of Certificate in Official Statistics (PG/CERT). The successful completion of 12 instructional units leads to the award of Diploma (PG/DIP) in Official Statistics.

If you pass the Diploma, you will be permitted to undertake a supervised dissertation for the degree of MSc in Official Statistics.

Alternatively, the different instructional units of the MSc may be taken as one-off units, with or without assessment, for Continuing Professional Development or if you are interested in updating or refreshing your statistical skills in a particular area.

More information can be found on the university's website: www.soton.ac.uk

Or contact:

University of Southampton

Tel: **02380 597782**

An application form can be requested by emailing:
moffstat@socsci.soton.ac.uk

"I started studying the MSc in Official Statistics when I started work at the Office for National Statistics. I have found the modules extremely interesting and have gained a great deal of knowledge that I have been able to apply in the work place.

I have found that the modules have given me a good overview of the survey process as well as a good understanding of the theory and practical application of a range of survey methodologies. I liked that, apart from the core modules, I had a choice about what I could study and used this opportunity to look at topics that I had not covered in my first degree."

Notes

Further information

Statistical Training Service

Room 1127

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Cardiff Road

Newport

NP10 8XG

Email: statistical.training.enquiries@ons.gsi.gov.uk

Government
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National Statistics