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**Statistical Short Course Information Brochure**

**For those looking to develop their Statistical or Data Science knowledge and skills**

**January 2017**

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[**Analytical and Data Science Branches of ONS Learning Academy**](mailto:gss.capability@ons.gsi.gov.uk)

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| **This policy has been authorised by** | **Head of Analytical and Data Science Branches of ONS Learning Academy** |
| **Policy Owner** | **Head of Analytical and Data Science Branches of ONS Learning Academy** |
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**About us**

This brochure has been developed by the Analytical and Data Science branches of the ONS Learning Academy (previously the GSS Capability Team/Statistical Training Service.) Our aims are to ensure the Statistical and Data Science learning needs of the GSS and GSG are met.

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**Part One – ONS Statistical Short Course Details**

**Level 1 Courses**

1. **Quality and Statistics**

Level: Level 1

Location: Newport and Titchfield

Duration: 1 day

**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 following the Generic Statistical Business Process Model (GSBPM)
* Knowledge in the practical application of quality and how to implement it
* An overview of relevant guidance and tools

1. **Introduction to Questionnaire Design and Testing**

Level: Level 1

Location: Newport and Titchfield

Duration: 1 day

**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 and web data collection
* 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

1. **Administrative Data**

Level - Level 1

Location – Newport and Titchfield

Duration – 1 day

**Aims**

To consider the differences between survey and administrative data by:

* highlighting some of the challenges when linking different datasets
* providing an insight into 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

1. **Data Linkage**

Level - Level 1

Location – Newport, Titchfield and London

Duration – 1 day

**Aims**

This course will provide participants with an introduction to the principles, theory and practice of data linkage. Data linkage is playing an increasing role in producing statistics, to support a wide range of users and uses, through integration of data from multiple sources. The increased use of data sharing and data linkage will be key strategic issues in the next few years.

**Objectives**

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

* the difficulties involved in data linkage
* desirable qualities of matching variables
* how to prepare datasets before matching
* different types of linkage methods
* how to link very large datasets
* how to evaluate the quality of your matches
* how to link encrypted datasets

1. **Sample Design and Estimation (Social)**

Level: Level 1

Location: Newport and Titchfield

Duration: 2 days (Newport) 1 day (Titchfield)

**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 (Newport only)
* sample design and different sampling methods
* estimation of simple statistics under various designs and their associated standard errors and confidence intervals
* the use of weights

1. **Sample Design and Estimation (Business)**

Level = Level 1

Location = Newport

Duration = 2 days

**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

1. **Population Statistics and the Census**

Level – Level 1

Location - Titchfield

Duration – 1 day

**Aims**

To introduce participants to key ONS demographic outputs and provide an understanding of the range of outputs produced and the challenges involved.

**Objectives**

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

* key elements of conducting a census and population estimates
* migration estimates and population projections
* how demographic analysis is conducted by ONS

1. **Editing and Imputation**

Level – Level 1

Location – Newport

Duration 1 day

**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

1. **Introduction to National Accounts**

Level – Level 1

Location - Newport

Duration – 1 day

**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 practice

**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 in the UK
* understand why we need to balance
* identify the participants in the economy and the transactions that flow between them

1. **Statistical Disclosure Control**

Level – Level 1

Location – Newport, Titchfield and London

Duration – 1 day

**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 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 control risk
* the disclosure techniques and tools that are used to protect data
* the GSS standards for disclosure control

1. **Geography For Statistics**

Level – Level 1

Location – Newport and Titchfield

Duration – 2 days

**Aims**

To introduce participants to:

* the importance of geography in the production and use 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 nature of statistical geography in the UK
* the importance to statistics of getting your geography right
* the different types of statistical maps and their interpretations
* how to produce a basic statistical map
* the application of the GSS Geography Policy
* sources of geography data for Official Statistics

1. **Seasonal Adjustment**

Level – Level 1

Location - Newport

Duration – 1 day

**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-13-ARIMA-SEATS (GSS recommended software for seasonal adjustment)

**Objectives**

By the end of the course through a mixture of theory and 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

1. **Index Numbers**

Level – Level 1

Location – Newport

Duration – 1 day

**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 deflation and referencing

1. **Data Visualisation**

Level – Level 1

Location – Newport, Titchfield and London

Duration – 1 day

**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

1. **Communicating Statistics**

Level - Level 1

Location – Newport and Titchfield

Duration – 1 day

**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

**Level 2 courses**

1. **Sample Design and Estimation (Social)**

Level – Level 2

Location - Newport

Duration – 1 day

**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

1. **Sample Design and Estimation (Business)**

Level – Level 2

Location – Newport

Duration – 1 day

**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

1. **Small Area Estimation**

Level – Level 2

Location - Newport

Duration – 1 day

**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

1. **Geography For Statistics – Spatial Analysis**

Level – Level 2

Location – Titchfield

Duration – 1 day

**Aims**

To give participants an introduction to geographic/spatial analysis in the context of Official Statistics, focussing on location to gain a deeper understanding of data.

**Objectives**

By the end of the course, participants will:

* understand what is ‘special’ about spatial data
* understand some necessary spatial statistical concepts
* be able to apply a selection of spatial statistical techniques and interpret the outputs
* to be able to confidently identify, analyse and interpret spatial patterns in data
* gain hands-on experience working with software designed for spatial analysis

1. **Seasonal Adjustment**

Level – Level 2

Location – Newport

Duration 2 days (inclusive of 1 day L1 course, if you have previously attend L1 please contact GSS Capability)

**Aims**

To give participants:

* an introduction to basic and advanced theory behind seasonal adjustment and the seasonal adjustment process
* the ability to use the US Census Bureau’s software X-13-ARIMA-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-13-ARIMA-SEATS, course participants will:

* gain an in-depth 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

1. **Index Numbers**

Level – Level 2

Location - Newport

Duration – 1.5 days

**Aims**

To introduce participants to:

* the theoretical background to index numbers
* index number techniques used in practice
* aspects of the Consumer Price 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

1. **Hypothesis Testing**

Level – Level 2

Location – Newport and Titchfield

Duration – 1 day

**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

**Part Two – Statistical Short Course Timetable for 2016-2017**

The Office for National Statistics (ONS) is the key provider of statistical training for member of the Government Statistical Service (GSS).The short course programme delivers courses on the main methods used in Official Statistics, providing an overview of various statistical and analytical techniques and includes information on how and why to choose the appropriate methodology.

**The costs for courses are:**

**1 day course** - £116.00, **1.5 day course** - £167.00, **2 day course** - £206.00

**The entry requirements for courses are:**

* Level 1 courses do not require previous knowledge as they provide an introduction to a subject.
* Level 2 courses require the applicant to have a degree in Mathematics/Statistics or a good working knowledge of the subject.

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| Course (September – December 2016) | Level | Newport | Titchfield | London |
| Quality and Statistics | L1 | 14/09/16 | 13/10/16 |  |
| Administrative Data | L1 | 20/09/16 | 10/11/16 |  |
| Data Visualisation | L1 | 22/09/16 |  |  |
| Communicating Statistics | L1 | 28/09/16 | 30/11/16 |  |
| Data Linkage | L1 | 29/09/16 | 20/11/16 |  |
| Introduction to Questionnaire Design and Testing | L1 | 05/10/16 | 24/11/16 |  |
| Statistical Disclosure Control | L1 | 06/10/16 | 06/12/16 |  |
| Geography for Statistics | L1 | 12&13/10/16 | 16&17/11/16 |  |
| Introduction to National Accounts | L1 | 12/10/16 |  |  |
| Administrative Data | L1 | 19/10/16 |  |  |
| Sample Design and Estimation (Business) | L1 | 02&03/11/16 |  |  |
| Sample Design and Estimation (Social) | L1 | 09&10/11/16 | 03/11/16 |  |
| Quality and Statistics | L1 | 16/11/16 |  |  |
| Index Numbers | L1 | 23/11/16 |  |  |
| Geography (ONS 2 days – GSS 1 Day) | L1 | 30&01/11/16 |  |  |
| Editing & Imputation | L1 | 01/12/16 |  |  |
| Sample Design and Estimation (Social) | L2 | 07/12/16 |  |  |
| Seasonal Adjustment (Day 1 L1, Day 2 L2) | L1/2 | 07&08/12/16 |  |  |
| Population Statistics and the Census | L1 |  | 29/09/16 |  |

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| Course (December 2016 – July 2017) | Level | Newport | Titchfield | London |
| Administrative Data | L1 | 14/12/16 |  |  |
| Introduction to National Accounts | L1 | 25/01/17 |  |  |
| Hypothesis Testing | L2 | 01/02/17 |  |  |
| Sample Design and Estimation (Business) | L2 | 15/02/17 |  |  |
| Sample Design and Estimation (Social) | L2 | 01/03/17 |  |  |
| Editing & Imputation | L2 | 08/03/17 |  |  |
| Statistical Disclosure Control | L1 | 22/03/17 |  | 20/06/17 |
| Communicating Statistics | L1 | 29/03/17 |  |  |
| Data Visualisation | L1 | 26/04/17 |  |  |
| Small Area Estimation | L2 | 07/06/17 |  |  |
| Seasonal Adjustment(Day 1 L1, Day 2 L2) | L1/2 | 14&15/06/17 |  |  |
| Index Numbers | L2 | 21&22/06/17 |  |  |
| Data Visualisation | L1 | 28/06/17 |  | 14/03/17 |
| Introduction to Questionnaire Design and Testing | L1 |  | 23/02/17 |  |
| Data Linkage | L1 |  | 08/06/17 | 07/03/17 |
| Geography for Statistics – Spatial Analysis | L2 |  | 09/03/17 |  |
| Quality and Statistics | L1 |  | 23/03/17 |  |
| Administrative Data | L1 |  | 30/03/17 |  |
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