AQMeN TRAINING EVENT: MULTILEVEL MODELLING
APPLICATION FORM

Places for this training event are limited to 25. In order for us to ensure that our training places are offered to those who will benefit most, potential participants are asked to complete this application form. Please provide an honest appraisal of your current level of expertise in using a range of statistical techniques, and indicate what benefits you would expect to receive from this particular training event. If there is sufficient demand, this event may be run again in the future.

At the end of this application form there is a short quiz that all applicants should complete. This will allow us to assess your existing knowledge of Multiple Regression, one of the pre-requisites for the course.

1. Please provide your personal and contact details below:

Full name:	**Title:** **(Mr / Mrs / Ms / Dr / Professor / Other)**
Institution/organization and discipline:	**Job title:**
Email address:	**Contact Telephone number:**
Contact address:	

2. Please indicate your highest qualification in a mathematical subject:

Undergraduate degree, MSc or PhD ○

First or second year of a mathematical undergraduate course ○

Mathematics or statistics module in a non-mathematical undergraduate course ○

Higher, sixth year studies, advanced higher, A level or other upper secondary qualification ○

Standard grade, O grade, GCSE, O level or other lower secondary qualification ○

3. Please indicate how experienced you are with using the following techniques:

	Very	Moderately	Slightly	Not at all
Inferential statistical methods (e.g. chi-square, t-tests, ANOVA, Wilcoxon tests)	○	○	○	○
Simple linear regression	○	○	○	○
Multiple linear regression	○	○	○	○
Logistic regression	○	○	○	○
Multinomial regression	○	○	○	○
Regression for ordinal or count data	○	○	○	○
Multilevel models for normally distributed data	○	○	○	○
Multilevel models for binary, multinomial or count data	○	○	○	○

4. Which of the following statistical packages have you used?

SPSS ☐ STATA ☐ MLwiN ☐ SAS ☐ Other (state which) ☐

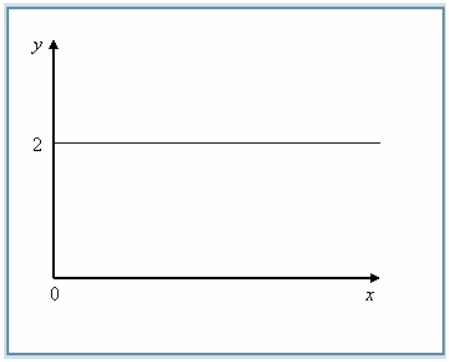
5. Please provide a brief description of how often you use statistics and what you use them for (max 100 words):

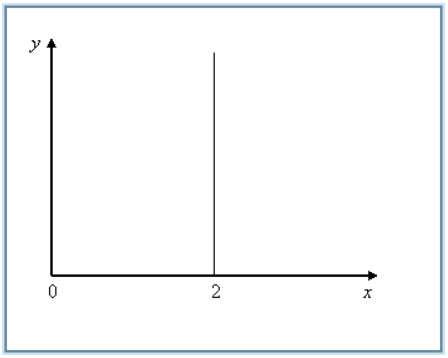
6. Explain why multilevel models may be helpful in your work (max 100 words):

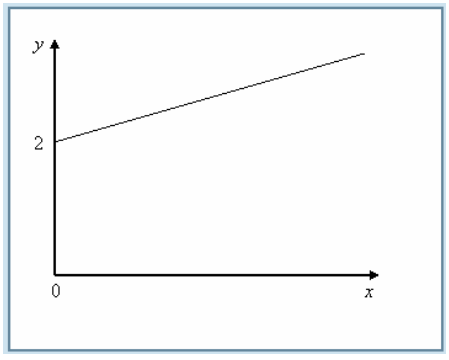
7. **Describe any projects that you are involved in where multilevel models would be appropriate? (max 100 words):**

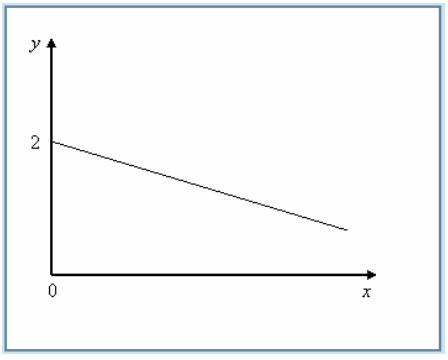
8. **Please answer the following five questions in order for us to assess your existing knowledge:**

   A. Which of the following graphs shows a regression line with equation *y* = 2 + 0.*x*? Select the radio button at the bottom of one of the graphs.







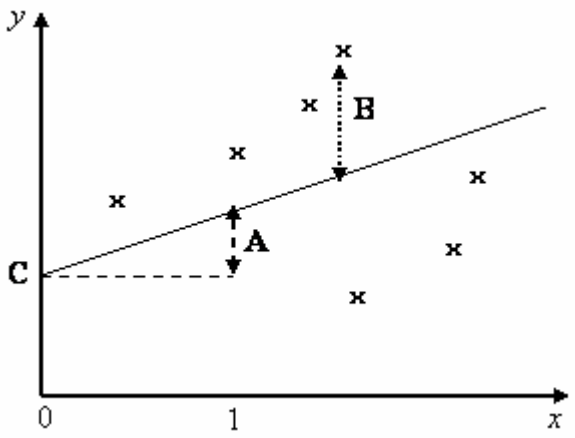


   B. A simple linear regression model is fitted to the relationship between individual income (Y) and age in years (X). Income is measured in units of £1,000 and age has been centred at the sample mean of 40 years. The fitted equation is:

$$\hat{y} = 15 + 0.5x$$

What is the predicted income for someone who is 50 years old?

C. The equation of the simple linear regression model is: $y_i = \beta_0 + \beta_1 x_i + e_i$



Each symbol matches a letter. Please choose which letters match to the symbols in the graph:

β_0		β_1		e_i	
A	○	**A**	○	**A**	○
B	○	**B**	○	**B**	○
C	○	**C**	○	**C**	○

D. A simple linear regression model is fitted to the relationship between individual income and the number of years in employment. Income is measured in units of £1000. From the fitted model, we conclude the following:

I. The relationship between income and years in employment is statistically significant at the 5% level
II. The predicted income for someone at the start of their career (i.e. no years in employment) is £15,000, and
III. Income is predicted to increase by £500 for each additional year employed.

From which of the following sets of results could all three conclusions above be reached? Select the radio button under the table you choose:

Variable	Coefficient	Standard error
Constant	15.0	3.5
Years employed	5.0	2.0

○

Variable	Coefficient	Standard error
Constant	15.0	3.5
Years employed	0.5	0.2

○

Variable	Coefficient	Standard error
Constant	150.0	35.3
Years employed	5.0	4.2

○

Variable	Coefficient	Standard error
Constant	15.0	3.5
Years employed	0.5	0.4

○

E. Two studies were carried out to examine the relationship between income (Y, in units of £1,000) and years of employment (X). In each study, a sample was drawn from the UK adult population but the sample size was 10,000 in one study and 100 in the other. The following table shows two sets of results (estimates co-efficients and standard errors), one from Study A and one from B.

	Study A		Study B	
Variable	Coeff.	SE	Coeff.	SE
Constant	12.81	3.55	12.32	0.032
Years employed	0.43	0.22	0.38	0.002

Which of A and B had a sample size of 10,000 and which had a sample size of 100? Why?

	Justification
J1	Because the standard errors are larger in Study A, and standard errors **increase with sample size**
J2	Because the standard errors are larger in Study A, and standard errors **decrease with sample size**
J3	Because the coefficients **are slightly larger in Study A**

Please select one answer from the radio buttons below with justification J1, J2 or J3:

- ○ **A** has a sample size of **100** and **B** has a sample size of **10,000, J2**
- ○ **A** has a sample size of **10,000** and **B** has a sample size of **100, J1**
- ○ **A** has a sample size of **10,000** and **B** has a sample size of **100, J2**
- ○ **A** has a sample size of **10,000** and **B** has a sample size of **100, J3**
- ○ **A** has a sample size of **100** and **B** has a sample size of **10,000, J1**
- ○ **A** has a sample size of **100** and **B** has a sample size of **10,000, J3**

Thank you for completing this application form. Please return it to events@aqmen.ac.uk by 5pm on Sunday 8th August. You will be informed whether you have a place on this course by 5pm on Thursday 12th August.