



Institute of Archaeology

ARCL0087

Exploratory Multivariate Analysis in Archaeology  
15 credits

2023–2024

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Room 204c

Deadline: Monday 15th January 2024

**Important Information Regarding Assessments**

Important information regarding assessments, rules, regulations *etc.* including link to online resources at UCL is provided on page [5](#)

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# 1 Module overview

## 1.1 Module description

This module provides an introduction to the main exploratory multivariate techniques in use in archaeology, namely cluster analysis, Principal Components Analysis (PCA), Correspondence Analysis (CA) and Discriminant Analysis. Extensions of these techniques, such as bootstrapped or detrended CA will also be explored. The module concentrates on the use of these techniques: what types of data they can examine, how to interpret the results, the pit-falls in the use of these techniques and so on. Wherever possible, the details of the underlying mathematics will not be examined in any detail.

The module will contain a substantial practical element. All the analyses will be conducted using the open-source statistical software package R which is freely available via the Internet.

## 1.2 Aims

The module aims to provide:

- A knowledge of the main multivariate statistical techniques used in archaeology.
- Practical experience of undertaking these analyses using the R statistical system.
- The relative strengths and weaknesses of the various techniques.

## 1.3 Objectives

The module objectives are that you will be able to:

- Choose and apply the appropriate techniques for various data sets and questions you may encounter.
- Be able to interpret the results of your analyses and identify potential problems.
- Report on your analyses in an appropriate manner.

## 1.4 Learning outcomes

In meeting these objectives you will also be able to demonstrate the following learning outcomes:

- A critical approach to the collection and statistical analysis of data.
- Practical experience of using command-line software and writing small code fragments.
- Ability to evaluate critically published examples of multivariate analyses.
- Understanding of what makes for a good graph and table, and what makes a bad one.
- The ability to communicate the methodology and interpretation of a statistical analysis.

## 1.5 Methods of assessment

This module is assessed by means of a total of 4000 words of coursework consisting of a single data analysis project. You will be expected to identify a suitable data set with associated problems.

If students are unclear about the nature of the assignment, they should contact the Module Co-ordinator. The Module Co-ordinator will be willing to discuss an outline of their approach to the assessment, provided this is planned suitably in advance of the submission date.

## 1.6 Communications

- Moodle is the main hub for this course.
- Important information will be sent to you via the QuickMail feature of Moodle.
- Please pose any general queries relating to module content, assessments and administration to the course coordinator via email.
- Do not use MS Teams for this module. It is not monitored.
- For personal queries, please contact the co-ordinator by email.

## 1.7 Week-by-week summary

Week	Date	Session	Subject
1	6th October 2023	1	Introduction to the module. Basic data exploration. Use of the R statistical system.
2	13th October 2023	2	Cluster Analysis (I). Standard techniques.
3	20th October 2023	3	Cluster Analysis (II). Variations and advanced methods.
4	27th October 2023	4	Correspondence Analysis (I).
5	<b>TBA</b>	5	Correspondence Analysis (II). Advanced methods including detrended and bootstrapped CA.
6	17th November 2023	6	PCA (I).
7	24th November 2023	7	PCA (II). Additional methods including log-ratio methods and their problems.
8	1st December 2023	8	Discriminant Analysis (I). Basics.
9	8th December 2023	9	Discriminant Analysis (II). Other methods including decision trees.
10	15th December 2023	10	Other methods, wrapping-up, discussing your projects <i>etc.</i>
	15th January 2024	Assessment due	

## 1.8 Teaching methods

Teaching will be by a mixture of lectures and supervised practical sessions. Classes will consist of two hours per week. Practical classes will normally involve direct supervision for one hour, often followed by a further hour during which time the tutor will be available to help as you work through exercises on your own.

You will also be given data sets to examine during the week between classes which will then be discussed at the start of the following week allowing you to gain practical experience in analysis and interpretation.

## 1.9 Workload

This is a 15-credit module which equates to 150 hours of learning time including session preparation, background reading, and researching and writing your assignment. With that in mind you should expect to organise your time in roughly this way:

- 20–30 hours of lectures and supervised practicals;
- 75–85 hours of reading and independent project work;
- 45 hours producing the assessed work.

## 1.10 Prerequisites

You should have a basic understanding of statistical methods, *e.g.*, the normal distribution, probability, correlation. You should also be willing to master a command-line based statistical package.

## 1.11 Coursework

The assignment and possible approaches to it will be discussed in class, in advance of the submission deadline. If students are unclear about the nature of an assignment, they should discuss this with the module co-ordinator in advance. You will receive feedback on your written coursework via Moodle.

For more details see the ‘Assessment’ section on Moodle. The coursework coversheet is available on the course Moodle pages and here: <https://www.ucl.ac.uk/archaeology/current-studentsunder> ‘Policies, Forms and Guidelines’.

*Please make sure you enter your five-digit candidate code (not your student ID number) on the coversheet and in the subject line when you upload your work in Moodle.*

*Please use your five-digit candidate code in the name of the file you submit.*

The marking criteria for this assessment is discussed below. The IoA Study Skills Guide provides useful guidance on writing different types of assignment.

Please note that late submission, exceeding the maximum word count and academic misconduct (unacknowledged use of text generation software and plagiarism) will be penalized and can significantly reduce the mark awarded for the assignment and/or overall module result. Please do consult

- <https://www.ucl.ac.uk/archaeology/current-students/ioa-student-handbook/13-information-assessment> with sections 13.7–13.8: coursework submission, 13.10: word count, 13.12–14: academic integrity
- <https://www.ucl.ac.uk/students/exams-and-assessments/academic-integrity> for UCL’s guidance on academic integrity
- <https://library-guides.ucl.ac.uk/referencing-plagiarism/acknowledging-AI> for UCL’s guidance on how to acknowledge the use of text generation software.

Please note that for this course you may use AI tools to help improve your written English, but you *may not* use them to actively help with your assignment (for example, choosing the right statistical technique or helping with coding in R).

### Assessment tasks

This module is assessed entirely by coursework consisting of the assignment described here. Prior to the assessment, you must submit a one-page summary of the data you intend to use and some suggestions of the sorts of questions you wish to answer. This piece of work is formative (*i.e.*, does not contribute to the module mark) but compulsory. **The deadline for the formative assignment is Monday 27th November.**

In the final class we will look at the data sets and questions and make some suggestions of how to analyse that data set.

This module is assessed by means of a 4,000 word data analysis project on a topic of your own choice. A fall-back project will be provided for anyone who cannot provide their own.

The report should have the following structure:

1. the data: what they are, where they come from, any limitations
2. statement of archaeological problems/questions
3. choice of analytical/exploratory techniques (uni- and multivariate)
4. R packages used
5. outcomes of analyses
6. statistical discussion
7. archaeological discussion
8. review of the project (*e.g.*, comments on how it might be improved)
9. bibliography.
10. Appendix A: summary of the R commands and code used to undertake the analyses and produce the graphs.
11. Appendix B: the data.

The data should also be provided in an Excel spreadsheet or as a `.RData` file. If the data are particularly extensive, omit Appendix B but you *must* then provide the data electronically.

Sufficient information should be given in the text and Appendix A for the tutor to be able to replicate your analyses.

The following points will be taken into account in assessment:

1. critical assessment of the data
2. formulation of archaeological questions
3. choice of appropriate techniques
4. correct use of techniques
5. interpretation
6. presentation.

The presentation of your results include appropriate use of graphics and tables, and the quality of those tables.

Students are not permitted to re-write and re-submit assignments in order to try to improve their marks. However, students may be permitted, in advance of the deadline for a given assignment, to submit for comment a brief outline of the assignment. The Module Co-ordinator is willing to discuss an outline of the student's approach to the assignment, provided this is planned suitably in advance of the submission date.

The **submission deadline** for the final assessment is **Monday 15th January 2024**.

## 1.12 Basic texts

The key text for this module is that by Baxter (2015). I have written a guide for undertaking all the analyses in Baxter's book in R and provided the code (Lockyear 2020). This is available via Academia.edu and the Moodle page.

Helpful material can also be found in Shennan (1997) and Drennan (2004). A recent book by Carlson (2017) has much useful material and some alternative methods of performing the analyses. Carlson's webpages also provide guides to undertaking all the analyses from those two books in R.

### Reading

Baxter, M. J. (2015). *Exploratory Multivariate Analysis in Archaeology*. New York: Percheron Press. INST ARCH AK 10 BAX Also available at jstor via the library.

Carlson, David L. (2017). *Quantitative Methods in Archaeology using R*. Cambridge: Cambridge University Press. INST ARCH AK 10 CAR.

Drennan, Robert R. (2004). *Statistics for Archaeologists: a commonsense approach*. second. New York: Springer. INST ARCH AK 10 DRE; PDF download available via library catalogue.

Lockyear, Kris (2020). *A companion to Exploratory Multivariate Analysis in Archaeology using R*. URL: [https://www.academia.edu/43034760/A\\_companion\\_to\\_Exploratory\\_Multivariate\\_Analysis\\_in\\_Archaeology\\_using\\_R](https://www.academia.edu/43034760/A_companion_to_Exploratory_Multivariate_Analysis_in_Archaeology_using_R).

Shennan, S. J. (1997). *Quantifying Archaeology*. 2nd ed. Edinburgh: Edinburgh University Press. INST ARCH AK 10 SHE.

## 2 Schedule and syllabus

### 2.1 Teaching schedule

The course will be taught in Term 1. Classes will be held on Friday from 1–3pm in the AGIS lab.

### 2.2 Detailed week-by-week syllabus

The following is an outline for the course as a whole, and identifies essential and supplementary readings relevant to each session. Information is provided as to where in the UCL library system individual readings are available.

#### Session 1: Introduction to statistics and R

Introduction to basic statistics and exploring data in tabular and graphical form. Introduction to the R statistical system.

A good all-round statistical textbook for archaeology is that by Drennan (2004). Shennan (1997) covers similar material although in different ways. Orton (1980) is rather old now, but still a very approachable introduction to statistical methods in archaeology and worth the read.

There are many guides to R, both published and online. I like that by Cornillon et al. (2012); others include Everitt and Hothorn (2010) and Crawley (2007). Baxter's online publication *Notes on Quantitative Archaeology and R* is extremely useful too (Baxter 2015). For graphics, see Baxter and Cool (2016). Carlson (2017) contains much useful information for all parts of this course as well as detailed R code.

## Reading

- Baxter, M. J. (2015). *Notes on Quantitative Archaeology and R*. URL: [https://www.academia.edu/12545743/Notes\\_on\\_Quantitative\\_Archaeology\\_and\\_R](https://www.academia.edu/12545743/Notes_on_Quantitative_Archaeology_and_R).
- Baxter, M. J. and H. E. M. Cool (2016). *Basic Statistical Graphics for Archaeology with R: Life Beyond Excel*. URL: [https://www.academia.edu/29415587/Basic\\_Statistical\\_Graphics\\_for\\_Archaeology\\_with\\_R\\_Life\\_Beyond\\_Excel](https://www.academia.edu/29415587/Basic_Statistical_Graphics_for_Archaeology_with_R_Life_Beyond_Excel).
- Carlson, David L. (2017). *Quantitative Methods in Archaeology using R*. Cambridge: Cambridge University Press. INST ARCH AK 10 CAR.
- Cornillon, Pierre-André et al. (2012). *R for Statistics*. Boca Raton, London and New York: CRC Press. INST ARCH AK 10 COR.
- Crawley, Michael J. (2007). *The R Book*. Chichester: Wiley. INST ARCH AK 10 CRA and online via the library catalogue.
- Drennan, Robert R. (2004). *Statistics for Archaeologists: a commonsense approach*. second. New York: Springer. INST ARCH AK 10 DRE; PDF download available via library catalogue.
- Everitt, Brian S. and Torsten Hothorn (2010). *A Handbook of Statistical Analyses Using R*. Boca Raton, London and New York: CRC Press. COMPUTER SCIENCE G 30 EVE.
- Orton, C. R. (1980). *Mathematics in Archaeology*. London: Collins. INST ARCH AK 10 ORT.
- Shennan, S. J. (1997). *Quantifying Archaeology*. 2nd ed. Edinburgh: Edinburgh University Press. INST ARCH AK 10 SHE.

## Session 2: Cluster Analysis (I)

Aims of the technique; measuring similarity and dissimilarity; hierarchical clustering, k-means clustering.

A very readable introduction to cluster analysis is given by Orton (1980, chapter 2). A more detailed introduction is given by Shennan (1997, chapter 11). Baxter (2015a, chapter 7) is the essential reading for this week (note that this is a reprint of the 1994 edition is thus over 20 years old, but it is till one of the best discussions of the topic). See also Baxter (2003, chapter 8) and Baxter (2015b, chapter 10). For undertaking analyses in R, see Carlson (2017, chapter 15), Cornillon et al. (2012, chapter 11) or Crawley (2007, pp. 738–44).

There are very many archaeological examples. Two examples are those by Peacock (1989) and Lockyear (2000).

## Reading

- Baxter, M. J. (2003). *Statistics in Archaeology*. London: Arnold. INST ARCH AK 10 BAX.
- (2015a). *Exploratory Multivariate Analysis in Archaeology*. New York: Percheron Press. INST ARCH AK 10 BAX Also available at jstor via the library.



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- (2015b). *Notes on Quantitative Archaeology and R*. URL: [https://www.academia.edu/12545743/Notes\\_on\\_Quantitative\\_Archaeology\\_and\\_R](https://www.academia.edu/12545743/Notes_on_Quantitative_Archaeology_and_R).
- Carlson, David L. (2017). *Quantitative Methods in Archaeology using R*. Cambridge: Cambridge University Press. INST ARCH AK 10 CAR.
- Cornillon, Pierre-André et al. (2012). *R for Statistics*. Boca Raton, London and New York: CRC Press. INST ARCH AK 10 COR.
- Crawley, Michael J. (2007). *The R Book*. Chichester: Wiley. INST ARCH AK 10 CRA and online via the library catalogue.
- Lockyear, Kris (2000). “Site finds in Roman Britain: a comparison of techniques”. In: *Oxford Journal of Archaeology* 19.4, pp. 397–423.
- Orton, C. R. (1980). *Mathematics in Archaeology*. London: Collins. INST ARCH AK 10 ORT.
- Peacock, D. P. S. (1989). “The mills of Pompeii”. In: *Antiquity* 63, pp. 205–214.
- Shennan, S. J. (1997). *Quantifying Archaeology*. 2nd ed. Edinburgh: Edinburgh University Press. INST ARCH AK 10 SHE.

### Session 3: Cluster Analysis (II)

Comparing clusterings; cluster validation fuzzy clustering, model-based clustering.

Baxter (2015a, chapter 7) is the essential reading for this week. See also Baxter (2003, chapter 8) and Baxter (2015b, chapter 10). The main example of fuzzy clustering in archaeology is that by Baxter (2009). See Baxter (2016, chapter 6) for its application to archaeometric data.

#### Reading

- Baxter, M. J. (2003). *Statistics in Archaeology*. London: Arnold. INST ARCH AK 10 BAX.
- (2009). “Archaeological Data Analysis and Fuzzy Clustering”. In: *Archaeometry* 51.6, pp. 1035–54.
- (2015a). *Exploratory Multivariate Analysis in Archaeology*. New York: Percheron Press. INST ARCH AK 10 BAX Also available at jstor via the library.
- (2015b). *Notes on Quantitative Archaeology and R*. URL: [https://www.academia.edu/12545743/Notes\\_on\\_Quantitative\\_Archaeology\\_and\\_R](https://www.academia.edu/12545743/Notes_on_Quantitative_Archaeology_and_R).
- (2016). *Multivariate Analysis of Archaeometric Data: An Introduction*. URL: [https://www.academia.edu/24456912/Multivariate\\_Analysis\\_of\\_Archaeometric\\_Data\\_An\\_Introduction](https://www.academia.edu/24456912/Multivariate_Analysis_of_Archaeometric_Data_An_Introduction).

### Session 4: Correspondence Analysis (I)

Basic CA; interpretation of the diagnostic statistics.

Greenacre (2007) provides a 25 class-length course in CA and is excellent at explaining many of the issues we are going to discuss this week and next week. It is available as a PDF download via the library. There is an expanded third edition (Greenacre 2017) but this is not available via the library. Shennan (1997, chapter 13) gives a step-by-step explanation. The essential reading is Baxter (2015, chapters 5 and 6). See also Baxter (2015, chapter 9).

The original paper introducing CA to anglophone archaeologists was that by Bølviken et al. (1982). I have published many CAs (Lockyear 2000; Lockyear 2007). Other examples include those by Pitts and Perring (2006) and Duff (1996).

A paper designed to explain CA to non-numerate numismatists is my *Simplifying Complexity* (Lockyear 2022), a pre-print version is available from my academia.edu site.

## Reading

- Baxter, M. J. (2015). *Exploratory Multivariate Analysis in Archaeology*. New York: Percheron Press. INST ARCH AK 10 BAX Also available at jstor via the library.
- Bølviken, E. et al. (1982). “Correspondence Analysis: an alternative to Principal Components”. In: *World Archaeology* 14, pp. 41–60.
- Duff, Andrew I. (1996). “Ceramic micro-seriation: types or attributes?” In: *American Antiquity* 61.1, pp. 89–101.
- Greenacre, M. J. (2007). *Correspondence Analysis in Practice*. 2nd ed. Boca Raton, London and New York: Chapman and Hall. PUBLIC POLICY QA 278 GRE; also available online via library catalogue.
- (2017). *Correspondence Analysis in Practice*. 3rd ed. Boca Raton, London and New York: Chapman and Hall. Not available via the library.
- Lockyear, Kris (2000). “Site finds in Roman Britain: a comparison of techniques”. In: *Oxford Journal of Archaeology* 19.4, pp. 397–423.
- (2007). *Patterns and Process in Late Roman Republican coin hoards 157–2 BC*. Oxford: British Archaeological Reports International Series 1733. YATES QUARTOS R 85 LOC.
- (2022). “Simplifying Complexity”. In: *Coin Hoards and Hoarding in the Roman World*. Ed. by Jerome Mairat, Andrew Wilson, and Chris Howgego. Oxford: Oxford University Press, pp. 23–52.
- Pitts, M. and D. Perring (2006). “The making of Britain’s first urban landscapes: the case of late Iron Age and Roman Essex”. In: *Britannia* 37, pp. 189–212.
- Shennan, S. J. (1997). *Quantifying Archaeology*. 2nd ed. Edinburgh: Edinburgh University Press. INST ARCH AK 10 SHE.

## Session 5: Correspondence Analysis (II)

Advanced CA: doubling, bootstrapped and detrended CA.

For doubling see Greenacre (2007, chapter 23). For bootstrapping see Lockyear (2013) and Lockyear (2022). For detrended CA see Lockyear (2000) and Carlson (2017, pp. 388–90).

## Reading

- Carlson, David L. (2017). *Quantitative Methods in Archaeology using R*. Cambridge: Cambridge University Press. INST ARCH AK 10 CAR.
- Greenacre, M. J. (2007). *Correspondence Analysis in Practice*. 2nd ed. Boca Raton, London and New York: Chapman and Hall. PUBLIC POLICY QA 278 GRE; also available online via library catalogue.
- Lockyear, Kris (2000). “Experiments with Detrended Correspondence Analysis”. In: *Computer Applications and Quantitative Methods in Archaeology 1996*. Ed. by K. Lockyear, T. J. T. Sly, and V. Mihăilescu-Bîrliba. Oxford: British Archaeological Reports International Series 845, pp. 9–17. INST ARCH AK 20 QTO COM.
- (2013). “Applying bootstrapped Correspondence Analysis to archaeological data”. In: *Journal of Archaeological Science* 40.12, pp. 4744–53.
- (2022). “Simulation, Seriation and the Dating of Roman Republican Coins”. In: *Journal of Computer Applications in Archaeology* 5.1, pp. 1–18.

## Session 6: Principal Components Analysis (I)

Basic PCA and biplots.

For the basics of PCA see Shennan (1997, chapter 12). The essential reading for today is Baxter (2015a, chapters 3 and 4). See also Baxter (2015b, chapter 7).

PCA in R is covered by Cornillon et al. (2012, section 10.1) and Carlson (2017, chapter 12)

### Reading

Baxter, M. J. (2015a). *Exploratory Multivariate Analysis in Archaeology*. New York: Percheron Press. INST ARCH AK 10 BAX Also available at jstor via the library.

— (2015b). *Notes on Quantitative Archaeology and R*. URL: [https://www.academia.edu/12545743/Notes\\_on\\_Quantitative\\_Archaeology\\_and\\_R](https://www.academia.edu/12545743/Notes_on_Quantitative_Archaeology_and_R).

Carlson, David L. (2017). *Quantitative Methods in Archaeology using R*. Cambridge: Cambridge University Press. INST ARCH AK 10 CAR.

Cornillon, Pierre-André et al. (2012). *R for Statistics*. Boca Raton, London and New York: CRC Press. INST ARCH AK 10 COR.

Shennan, S. J. (1997). *Quantifying Archaeology*. 2nd ed. Edinburgh: Edinburgh University Press. INST ARCH AK 10 SHE.

### Session 7: Principal Components Analysis (II)

Compositional data analysis.

The analysis of compositional data has proved controversial. For theoretical reasons J. A. Aitchison (1986) championed the use of log ratios, but this was argued to not be optimal by Tangri and Wright (1993). Somewhat belatedly, J. Aitchison, Barceló-Vidal, and Pawlowsky-Glahn (2002) rebuffed their comments. In practice, though, the situation is less clear-cut than they argue (Baxter and Freestone 2006). Scealy and Welsh (2014) give a good review from outside archaeology. More recently, Greenacre (2019) has proposed a weighted version of log-ratio analysis which claims to avoid some of the problems with that method. Boogaart and Tolosana-Delgado (2013) provide a good coverage of CoDA techniques for those confident in their maths. We will look at some compositional data analyses and compare results.

See also Baxter (2016, chapters 6 and 8).

### Reading

Aitchison, J. A. (1986). *The Statistical Analysis of Compositional Data*. London: Chapman and Hall. MATHEMATICS L 68 AIT.

Aitchison, J., C. Barceló-Vidal, and V. Pawlowsky-Glahn (2002). “Some comments on compositional data analysis in archaeometry, in particular the fallacies in Tangri and Wright’s dismissal of logratio analysis”. In: *Archaeometry* 44.2, pp. 295–304.

Baxter, M. J. (2016). *Multivariate Analysis of Archaeometric Data: An Introduction*. URL: [https://www.academia.edu/24456912/Multivariate\\_Analysis\\_of\\_Archaeometric\\_Data\\_An\\_Introduction](https://www.academia.edu/24456912/Multivariate_Analysis_of_Archaeometric_Data_An_Introduction).

Baxter, M. J. and I. C. Freestone (2006). “Log-ratio compositional data analysis in archaeometry”. In: *Archaeometry* 48, pp. 511–31.

Boogaart, K. Gerald van den and Raimon Tolosana-Delgado (2013). *Analyzing Compositional Data with R*. Heidelberg, New York, Dordrecht and London: Springer. MATHEMATICS L 10 R:BOO.

Greenacre, Michael J. (2019). *Compositional Data Analysis in Practice*. Boca Raton, London and New York: CRC Press.

- Scealy, J. L. and A. H. Welsh (2014). “Colours and cocktails: compositional data analysis. 2013 Lancaster lecture.” In: *Australian and New Zealand Journal of Statistics* 56.2, pp. 145–169.
- Tangri, D. and R. V. S. Wright (1993). “Multivariate analysis of compositional data: applied comparisons favour standard principal components analysis over Aitchison’s loglinear contrast method”. In: *Archaeometry* 35.1. Pages 112–115, a reply by M. J. Baxter, pp. 103–115.

### Session 8: Discriminant Analysis (I)

Basic discriminant analysis.

The essential reading for this week is Baxter (2015, chapter 9). See also Baxter (2016, chapter 7). See also Baxter (2015, chapter 11) and Baxter (2016, chapter 7). Cornillon et al. (2012, section 9.1) and Carlson (2017, chapter 11) give the details in R.

#### Reading

- Baxter, M. J. (2015). *Exploratory Multivariate Analysis in Archaeology*. New York: Percheron Press. INST ARCH AK 10 BAX Also available at jstor via the library.
- (2016). *Multivariate Analysis of Archaeometric Data: An Introduction*. URL: [https://www.academia.edu/24456912/Multivariate\\_Analysis\\_of\\_Archaeometric\\_Data\\_An\\_Introduction](https://www.academia.edu/24456912/Multivariate_Analysis_of_Archaeometric_Data_An_Introduction).
- Carlson, David L. (2017). *Quantitative Methods in Archaeology using R*. Cambridge: Cambridge University Press. INST ARCH AK 10 CAR.
- Cornillon, Pierre-André et al. (2012). *R for Statistics*. Boca Raton, London and New York: CRC Press. INST ARCH AK 10 COR.

### Session 9: Discriminant Analysis (II)

Advanced discriminant analysis including decision trees.

The essential reading for this week is Baxter (2015, chapter 10). See also Baxter (2003, chapter 9), Baxter (2015, chapter 11) and Baxter (2016, chapter 7).

#### Reading

- Baxter, M. J. (2003). *Statistics in Archaeology*. London: Arnold. INST ARCH AK 10 BAX.
- (2015). *Exploratory Multivariate Analysis in Archaeology*. New York: Percheron Press. INST ARCH AK 10 BAX Also available at jstor via the library.
- (2016). *Multivariate Analysis of Archaeometric Data: An Introduction*. URL: [https://www.academia.edu/24456912/Multivariate\\_Analysis\\_of\\_Archaeometric\\_Data\\_An\\_Introduction](https://www.academia.edu/24456912/Multivariate_Analysis_of_Archaeometric_Data_An_Introduction).

### Session 10: Other topics

Report writing, data presentation, other topics.

The essential reading for this week is Baxter (2015, chapter chapters 1 and 11) and Baxter (2003, chapter 1).

#### Reading

- Baxter, M. J. (2003). *Statistics in Archaeology*. London: Arnold. INST ARCH AK 10 BAX.

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— (2015). *Exploratory Multivariate Analysis in Archaeology*. New York: Percheron Press. INST  
ARCH AK 10 BAX Also available at jstor via the library.