

PRIMER and PERMANOVA+

A Course in Multivariate Analysis for Ecology & Other Sciences

PRESENTER:	Marti J. Anderson	
DATES:	Week 1: PRIMER	12 - 16 October 2026
	Week 2: PERMANOVA+	19 - 23 October 2026
VENUE (in person):	The Marine Biological Association of the United Kingdom (MBA), The Laboratory, Citadel Hill, Plymouth, U.K.	
or ONLINE:	British Summer Time (BST = UTC +1 hour)	

OVERVIEW

PRIMER-e is pleased to announce a **hybrid course** (offered **in-person* and *online*) of back-to-back courses in *Multivariate Analysis for Ecology & Other Sciences* to be held over two weeks at the Marine Biological Association of the United Kingdom (MBA). We'll be using our new software **PRIMER 8 with PERMANOVA+**. *Week 1* will cover the core non-parametric methods implemented in PRIMER. *Week 2* will cover the semi-parametric methods encapsulated in PERMANOVA+ and other advanced topics. Both weeks will include deep dives into a host of [new innovations](#) provided by the many tools and methods now available in our new software: **version 8**. Sessions will run daily, Monday to Friday, from **9:00 am to 5:45 pm** on each day. Online participants will join the course live *via Google Meet* (in the BST time-zone = UTC + 1 hour). Participants may register for **week 1 only**, **week 2 only**, or **both weeks**. Each day will include a mixture of lectures and computer lab sessions, in which participants can practice implementing the new methods learned on example datasets. Participants will also have the opportunity to discuss and analyse their own data in consultation with the presenter. Participants attending in person must **bring their own laptop** to the venue. Software may be purchased at a discounted price (see below), or a **free** fully functional (but time-limited) licence of the software is available to registered participants for trial use during the course. Note that PRIMER is a Windows-only product, so Macs need to run in Windows emulation. This course will cater both to those who are new to PRIMER and to those who are familiar with PRIMER methods but would like to learn all about the latest new methods and features in **PRIMER 8 with PERMANOVA+**.

VENUE

All sessions will be held at [The Marine Biological Association of the United Kingdom, The Laboratory, Citadel Hill, Plymouth, PL1 2PB, UK](#). For local information, including directions to the venue, please click [HERE](#) or contact the venue directly on +44 (0)1752 426493 or email: info@mba.ac.uk.

****Important:** please note that the venue will only accommodate a maximum of 24 participants to attend in person each week. If you wish to attend in person, please complete registration and make payment as soon as possible to secure your place.*

WEEK 1 - PRIMER

Week 1 will provide an extensive overview of statistical methods in non-parametric analysis of multivariate data implemented in **PRIMER** software. Non-parametric statistics and permutation tests make the methods intuitively simple to understand, so **no prior background in statistics is required**.

The topics covered in Week 1 include:

- Properties of multivariate data (summary statistics, shade plots, histograms, draftsman plots, etc.);
- Pre-treatment of data (transformations, normalisations, standardisations, dispersion weighting);
- Resemblance measures: distance, similarity & dissimilarity (Euclidean, Bray-Curtis, Sørensen, Jaccard);
- Cluster analysis (hierarchical agglomerative, divisive and k-R cluster methods using **CLUSTER**), including tests for significant structure within clusters (**SIMPROF**) to permit non-arbitrary classifications of samples/species;
- Ordination *via* projection using principal components analysis (**PCA**);
- Ordination to preserve sample relationships *via* non-metric, metric or threshold metric multi-dimensional scaling (**MDS**, **mMDS**, **tmMDS**);
- Handling **ordered variables/size-classes** using multivariate approaches, and the treatment of **empirical distributions**.
- Non-parametric permutation tests for differences among *a priori* groups of samples (analysis of similarities – **ANOSIM**) for one-, two- and three-way multi-factor designs and for ordered factors);
- Visualising group differences and variation in the group averages using **bootstrap averages**;
- Tests of association between resemblance matrices (**RELATE**), e.g., relating biotic to abiotic data, including finding optimal subsets of environmental (or other) variables that generate a ‘best’ match to patterns among samples based on species (or other) variables (**BEST**);
- Measures of biodiversity, including richness, even-ness/dominance, abundance-biomass curves, and taxonomic and/or functional diversity and distinctness (**DIVERSE**);
- Identifying important subsets of species and their roles in generating overall multivariate patterns (**BIOENV**, coherence curves) or group/cluster differences (**SIMPER**);
- Identifying roles of environmental (or other) variables in generating biotic patterns or distinctive splits using non-parametric classification and regression trees (**LINKTREE**);
- Graphical tools for effective presentation of results, including **matrix displays** and a variety of plot types (bar, box, dot, violin, means, line, histogram, scatter, surface, shade), **animations** of ordinations captured to video files, bubble plots and multi-variable **segmented bubble plots**.
- **Univariate non-parametric tests**, including Wilcoxon, Mann-Whitney, Kruskal Wallis, Kolmogorov-Smirnov, and Tests of association.
- **New univariate graphics**, including dotplots, violin plots and means plots.

WEEK 2 - PERMANOVA+

PERMANOVA+ allows robust analysis of multivariate data in response to complex sampling / experimental designs on the basis of a resemblance measure of choice, with rigorous inferences obtained using permutation methods. The broader suite of methods in **PERMANOVA+** enable formal models, tests, and predictions to be achieved for multivariate ecological (and other) systems that are over-parameterised (i.e., have too many variables) and/or that demonstrate substantial non-normality. Familiarity with the core methods in **PRIMER** and/or some prior knowledge of basic multivariate methods is desirable. However, Week 2 (like Week 1) will emphasise conceptual understanding, software implementation of the methods and interpretation of results for scientists and practitioners, so **no prior specific background in statistics is assumed**.

The topics covered in Week 2 include:

- Partitioning variation for high-dimensional data in the space of a chosen resemblance measure – a geometric approach (**PERMANOVA**);
- Tests for differences in centroids among groups and constructing specific contrasts (**PERMANOVA**);
- **Accommodating heterogeneity** in multivariate dispersions in **PERMANOVA** tests.

- Multivariate variation (spread), tests for homogeneity of multivariate dispersions and comparisons of beta diversity (**PERMDISP**);
- Constructing (pseudo) F-ratios and permutation methods for correct tests of individual terms in multi-factorial designs, based on expectations of mean squares (EMS).
- Complex multi-factor experimental designs, identifying **fixed and random factors** that are **nested in or crossed with** one another; fitting **seasonal/cyclical models** in PERMANOVA.
- **Centroid plots** for main effects and interactions; **Residual plots** for discovering non-dominant factor effects.
- Quantifying components of variation for individual terms in a PERMANOVA model, simplifying models by pooling or removing terms;
- Advanced experimental design topics, including repeated measures, **split plots**, randomized blocks, inclusion of covariates, imbalance & asymmetry, **finite factors**, and BACI designs.
- Fitting multivariate response data (e.g., species) to continuous predictor variables (e.g., environmental), including model selection (**DISTLM**);
- Visualising and quantifying explained (fitted) variation using dissimilarity-based redundancy analysis (**dbRDA**);
- Dissimilarity-based discriminant analysis *via* canonical analysis of principal coordinates (**CAP**), including leave-one-out allocation success and the predictive placement of new points into existing canonical model spaces;
- Discriminate positions along an environmental (or other) continuous variable axis; rotate two sets of variables to explore inter-relationships in a (dissimilarity-based) canonical correlation analyses (**CAP**).
- Identify outliers or impacts in time series or monitoring data using the new dissimilarity-based multivariate **Control Charts**.

COURSE FEES

The course fee **includes** coffee/tea and snacks during breaks, lunch, free Wi-Fi (for those participants attending in person), all course materials and a temporary time-limited (but fully functional) software licence key for the duration of the course. **In person** course participants will also receive a free **a 1-year membership** to [The Marine Biological Association of the United Kingdom](#). The fee **does not include** accommodation or other meals, or the separate (discounted) cost of purchasing subscriptions to PRIMER 8 software. Registration fees **for each week** are shown below:

Registration fees (in £GBP) for each week	In person	Online only
EARLY BIRD On or before 1 st August 2026	GBP £880 (£630 for full-time students)	GBP £760 (£495 for full-time students)
AFTER 1 st August 2026	GBP £995 (£720 for full-time students)	GBP £760 (£495 for full-time students)

All prices are in pounds sterling (£GBP). Participants who reside in either New Zealand or Australia will also need to pay the relevant goods and services tax, at invoice. Participants may (at the discretion of PRIMER-e) be eligible for a global equity discount on their registration fees (depending on their country of residence), which will be administered at the time of invoicing. Please contact primer@primer-e.com if you would like to apply and learn more.

DISCOUNTED SOFTWARE PRICES FOR COURSE PARTICIPANTS

We are pleased to offer all course participants a discount of **10% off** our standard prices for your initial software subscription. If you would like to receive a quote for a software subscription for PRIMER 8 with PERMANOVA+ (either a 12-month or 36-month term), please contact our team at primer@primer-e.com. All discounts for which you are eligible (including student discounts, global equity discounts, or recognition discounts for those with existing PRIMER 7 licences, etc.) will be applied to your subscription quote.

REGISTRATION

To register, please fill out the registration form on the [PRIMER-e website](https://primer-e.com) and return it directly to primer@primer-e.com to secure your place. The deadline for registration and payment is **28th September 2026**. Late registrants will only be accepted if space permits. Unfortunately, we cannot permit attendance at the course unless payment for registration has been **received in full** by PRIMER-e **prior** to the commencement of the course. Please get in touch with us directly if you have any questions primer@primer-e.com, and especially if you would like:

- to **receive a quote** for your registration;
- to register **more than one individual** from your organisation and pay on a single invoice (please include separate registration forms for each individual participant); or
- to receive a quote for **a software subscription** at a discounted price.

ABOUT THE PRESENTER

Marti J. Anderson is the Director of PRIMER-e (Quest Research Limited), a Fellow of the Royal Society of New Zealand and Distinguished Professor *Emerita* in the New Zealand Institute for Advanced Study (NZIAS) at Massey University in Auckland. Her core research is in community ecology, biodiversity, multivariate analysis, experimental design and resampling methods, with a special focus on developing novel statistical methods for ecology. She has developed all of the statistical methods in PERMANOVA+ and especially enjoys engaging in the dynamic interactions with students, academics and professionals that have become a trademark of the PRIMER/PERMANOVA+ international courses, shedding new light on multivariate data.