



## Advanced PRIMER 7 / PERMANOVA+ WORKSHOP

in St Petersburg, Florida, USA

Multivariate Analysis in Ecology (& other Sciences)

**Presenter:** Distinguished Prof. Marti J. Anderson

**Venue:** Weedon Island Preserve Visitors' Center, St Petersburg, Florida, USA

**Dates:** March 4<sup>th</sup>-8<sup>th</sup>, 2019

This **Advanced PRIMER 7 / PERMANOVA+** workshop is one week long (Monday – Friday, 08:15 to 17:15 on each day). Participants will engage in a mixture of informative lectures on key topics and computer lab sessions on literature data sets, with ample opportunity to discuss and analyze their own data sets in consultation with the lecturer (dedicated time for this is provided on the Friday). Participants are expected to **bring their own laptop**. Software either may be purchased (at a discounted price – see below) or a free fully functional but time-limited version will be made available to registered participants for trial use over the period of the workshop. Note that PRIMER is a Windows-only product, so Macs need to run in Windows emulation.

### Content

- This workshop will provide an overview of statistical methods in non-parametric analysis of multivariate data, encapsulated in the software: **PRIMER version 7**. It will cater primarily to those who have some working experience of PRIMER but are keen to learn about the latest developments in version 7. Important new tools include: **shade plots** with flexible ordering & clustering of axes; **coherence plots** to show species displaying statistically distinguishable response patterns; **unconstrained** binary or divisive **flat clustering** (as in *k*-means) along with **SIMPROF** tests; **metric, threshold metric, non-metric** or **combined MDS** in any dimensions; **bootstrap averages** to show variation among averages in metric MDS space; **new plot types** (bar, box, means, line, histogram, scatter, surface, shade) in 2-d or 3-d; **animations** of ordinations captured to video files; multi-factor and multi-variable **segmented bubble plots** in 2-d and 3-d; and much more...
- This workshop will also provide an overview of the methods in the **PERMANOVA+ add-on package** for PRIMER. PERMANOVA+ allows more formal models, tests and predictions for multivariate (or univariate) ecological (and other) data in dissimilarity spaces. Participants will explore partitioning multivariate variation in complex experimental/ sampling designs, including interactions, contrasts, fixed or random effects, crossed or nested (hierarchical) multi-factor mixed models (**PERMANOVA**); tests for homogeneity of dispersions and analyses of beta diversity (**PERMDISP**); multivariate regression and model-selection procedures (**DISTLM**); principal coordinate analysis (**PCO**); constrained ordination using distance-based redundancy analysis (**dbRDA**); and canonical analysis of principal coordinates, including discrimination and predictive canonical models (**CAP**).
- As well as covering advanced methods in **PRIMER v7 and PERMANOVA+**, the core basic multivariate routines (**PCA, MDS, ANOSIM, RELATE, BEST**) will also all be touched on briefly, including a review of data pre-treatment tools and definitions of (dis)similarity. Whilst aimed at existing PRIMER users, including those who have been to a previous PRIMER course, the week will be structured so that those who are new to this area will be able to learn much about the core methods and their potential extensions. Non-parametric/Semi-parametric statistics and permutation tests are conceptually intuitively simple to understand. **No prior background in statistics is required.**

### Venue

The workshop will be held in a classroom at Weedon Island Preserve Visitors' Center, 1800 Weedon Island Drive NE, Saint Petersburg, FL 33702, USA (<http://www.weedonislandpreserve.org/>). For further information and details, including directions to the venue, parking for participants, nearby hotels, etc., please contact the local workshop organiser, **Walt Jaap**, [wjaap@tampabay.rr.com](mailto:wjaap@tampabay.rr.com). Please note that it is the participant's responsibility to arrange and pay for their own accommodation - this is not included within the course fee.

### Registration Costs (in US dollars)

	<i>Full registration</i>	<i>Student Registration</i>
<b>EARLY BIRD*</b> <i>Before January 15th, 2019</i>	USD \$1,000	USD \$700
<i>After January 15th, 2019</i>	USD \$1,100	USD \$800

The course fee **includes** all course materials, lunches, coffee/tea and snacks during breaks, free wifi and (if needed) a temporary (fully functional but time-limited) software licence key(s) for PRIMER version 7 for the registrant to use over the duration of the workshop. The course fee **does not include** other meals, accommodation or the separate (discounted) costs of purchasing time-unlimited software. All prices are in US dollars.

### Contact and Registration

To express interest in attending, please send an email directly to the PRIMER-e office: [primer@primer-e.com](mailto:primer@primer-e.com). You will be sent a **registration form** and a detailed **schedule**. To register, please fill out the **registration form** and return it directly to [primer@primer-e.com](mailto:primer@primer-e.com) to secure your place. Places are limited. **Registration and payment must be received by February 15<sup>th</sup>, 2019**. Late registrants will only be accepted if space permits.

### Software – 20% discount for workshop participants

Participants wishing to purchase PRIMER software at the discounted prices shown below<sup>1</sup> should indicate this on the registration form. All prices are in US dollars.

	New PRIMER 7 (USD)	Upgrade PRIMER 6 to PRIMER 7 (USD)	PERMANOVA+ add-on (USD)
Private sector	\$800	\$400	\$400
Public sector	\$600	\$300	\$300
Academic	\$400	\$200	\$200
Full-time student	\$200	\$100	\$100

### About the Lecturer

**Distinguished Professor Marti J. Anderson** (Massey University and PRIMER-e, *FRSNZ*) is an ecological statistician whose work spans several disciplines, from ecology to mathematical statistics. A Fellow of the Royal Society of New Zealand, she is Distinguished Professor of Ecological Statistics in the New Zealand Institute for Advanced Study (NZIAS) at Massey University in Auckland, and 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. Marti has enjoyed working closely alongside the founders of PRIMER-E Limited (Bob Clarke and Ray Gorley) over many years, and is the new Director of PRIMER-e, following their formal retirement. She has developed all of the statistical methods in PERMANOVA+ and especially loves engaging in the dynamic interactions with students, academics and professionals that have become a trademark of the PRIMER international workshops, shedding new light on multivariate data.

<sup>1</sup> The 20% workshop discount applies only to purchases of 3 or fewer copies within a given sector, and excludes any additional discounts. Discounts for multiple purchases (i.e., up to 40%, see [www.primer-e.com](http://www.primer-e.com) for details) accrue in the usual way for 4 or more copies.