

# Syllabus

This is not the final version. It will be updated from time to time. FB = Fred Bookstein, JF = Joe Felsenstein.

<i>Who</i>	<i>lecture number</i>	<i>date</i>	<i>topic, readings</i>
JF	1.	9/29	Overview and initial topics, installing and using R
FB	2.	10/4	Overview. Chapter 1, emphasizing the variety of diagrams. Chapter 2, "one or two variables." Pictures of covariance, lines that fit well, correlations, lines that fit badly, initial examples -- Wright chickens, growth series.
FB	3.	10/6	Chapter 3. Multiple regression Logic of MR as path analysis The three main special cases (ANCOVA, growth innovations, LDISC). Morphometric examples: Bumpus, allometry in multiple groups
JF	4.	10/11	Quantitative genetics
JF	5.	10/13	Brownian motion and comparative methods
FB	6.	10/18	Introduction to GMM: how to keep your place in an anatomy. (Chapter 5.1.)
FB	7.	10/20	Methods for landmarks three at a time. Tensors; uniform term. (Chapter 5.2.)
FB	8.	10/25	FB's Chapter 4 ("Transition to Multivariate Analysis") The information matrix for a bivariate Gaussian distribution Covariance matrix inversion and covariance matrix eigenanalysis embody opposing approaches to measurement The Wishart distribution and its implications for PCA Critique of covariance matrices. Are they real? (I.e., does the organism know about them?) Do their inverses and/or their eigenanalyses have any biological meaning?
students	9.	10/27	Discussion (moderated, Fred and Joe not present)

Paul Sampson	10.	11/1	Continuation of coverage of Chap. 4
JF	11.	11/3	Comparative methods
FB	12.	11/8	Chapter 4 material, continued (see above)
FB	13.	11/10	Procrustes approaches and the relative warps (Chap. 5.3-5.4). Principal coordinates of shape; of size-shape. The critique of shape space as non-biological. The critique of Procrustes distance as enforcing unrealistic symmetries.
FB	14.	11/15	Thin-plate splines; partial warps; semilandmarks. [Chapter 5.5.]
FB	15.	11/17	Pattern engines for shape coordinates, and their graphics [Chapter 5.6.]
JF	16.	11/22	Discussion of uses of morphometrics at different levels (individual growth, phenotypic variation, population and species differences); Change due to neutral mutation
all		11/24	Anatomical dissection and consumption of a dinosaur
JF	17.	11/29	Adaptive peaks and Ornstein-Uhlenbeck processes
	18.	12/1	5 Student reports
JF	19.	12/6	One more student report; Comparative methods, continued
JF	20.	12/8	R example of migration effects; The morphometric consensus; sampling error