

## Example of a Mixed Factorial ANOVA in SPSS (a 3 X 3 mixed factorial, with 3 levels of lecture type and 3 levels of time)\*

### Descriptive Statistics

	LECTURE	type of lecture	Mean	Std. Deviation	N
BASELINE	1.000	physical science	47.75000	4.573474	4
	2.000	social science	41.25000	4.349329	4
	3.000	history	40.00000	3.915780	4
	Total		43.00000	5.257030	12
TWOVKS	1.000	physical science	44.25000	7.410578	4
	2.000	social science	26.00000	13.832329	4
	3.000	history	38.50000	5.802298	4
	Total		36.25000	11.817745	12
FOURWKS	1.000	physical science	28.00000	7.438638	4
	2.000	social science	10.75000	4.112988	4
	3.000	history	25.00000	5.228129	4
	Total		21.25000	9.430367	12

### Multivariate Tests<sup>f</sup>

Effect		Value	F	Hypothesis df	Error df	Sig.
TIME	Pillai's Trace	.963	104.309 <sup>a</sup>	2.000	8.000	.000
	Wilks' Lambda	.037	104.309 <sup>a</sup>	2.000	8.000	.000
	Hotelling's Trace	26.077	104.309 <sup>a</sup>	2.000	8.000	.000
	Roy's Largest Root	26.077	104.309 <sup>a</sup>	2.000	8.000	.000
TIME * LECTURE	Pillai's Trace	.683	2.335	4.000	18.000	.095
	Wilks' Lambda	.332	2.942 <sup>a</sup>	4.000	16.000	.053
	Hotelling's Trace	1.966	3.441	4.000	14.000	.037
	Roy's Largest Root	1.942	8.741 <sup>b</sup>	2.000	9.000	.008

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c.

Design: Intercept+LECTURE  
 Within Subjects Design: TIME

### Mauchly's Test of Sphericity<sup>b</sup>

Measure: MEASURE\_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon <sup>a</sup>		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
TIME	.691	2.952	2	.229	.764	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b.

Design: Intercept+LECTURE  
 Within Subjects Design: TIME

\* This numeric example is adapted from Keppel, G., & Zedeck S. (1989). Data analysis for research designs. New York: Freeman.

**Tests of Within-Subjects Effects**

Measure: MEASURE\_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
TIME	Sphericity Assumed	2974.500	2	1487.250	52.184	.000
	Greenhouse-Geisser	2974.500	1.528	1946.128	52.184	.000
	Huynh-Feldt	2974.500	2.000	1487.250	52.184	.000
	Lower-bound	2974.500	1.000	2974.500	52.184	.000
TIME * LECTURE	Sphericity Assumed	320.500	4	80.125	2.811	.057
	Greenhouse-Geisser	320.500	3.057	104.847	2.811	.078
	Huynh-Feldt	320.500	4.000	80.125	2.811	.057
	Lower-bound	320.500	2.000	160.250	2.811	.113
Error(TIME)	Sphericity Assumed	513.000	18	28.500		
	Greenhouse-Geisser	513.000	13.756	37.293		
	Huynh-Feldt	513.000	18.000	28.500		
	Lower-bound	513.000	9.000	57.000		

**Tests of Within-Subjects Contrasts**

Measure: MEASURE\_1

Source	TIME	Type III Sum of Squares	df	Mean Square	F	Sig.
TIME	Linear	2838.375	1	2838.375	196.692	.000
	Quadratic	136.125	1	136.125	3.198	.107
TIME * LECTURE	Linear	252.250	2	126.125	8.740	.008
	Quadratic	68.250	2	34.125	.802	.478
Error(TIME)	Linear	129.875	9	14.431		
	Quadratic	383.125	9	42.569		

**Tests of Between-Subjects Effects**

Measure: MEASURE\_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	40401.000	1	40401.000	459.683	.000
LECTURE	1194.000	2	597.000	6.793	.016
Error	791.000	9	87.889		

**Estimated Marginal Means  
 Profile Plots**

Estimated Marginal Means of MEASURE\_1

