ISE 2211 • Exam VII • 21 April 2021 NAME SOLUTION

Joe Tritschler has been teaching stats for a long time; in fact, fifteen times since 2013. He has always wondered if students perform differently when taking the course in summer vs. the usual spring or fall semesters, because the course is compressed into twelve weeks instead of the usual fourteen; plus, the class size is usually much smaller and students are often on a slightly different track than the standard program of study. The following is actual data on average final grades in ISE 2211 over several years' worth of teaching. Fill in the ANOVA table, test the null hypothesis that the treatment means on average class grade between the different semesters are equal at the $\alpha = 0.05$ level of significance, and use Fisher's Least Significant Difference to determine which, if any, pairs of semesters differ at $\alpha = 0.05$.

Semester	*Average Final Grades in ISE 2211*				Totals	Averages
	2017	2018	2019	2020		
Fall	77.75	82.26*	75.86	85.17	321.04	80.26
Summer	75.56	74.55	78.32	87.61	316.04	79.01
Spring	73.10**	81.21	81.79	79.72	315.82	78.955
					952.9	79.408

(+1) (+1)

$\sum\sum y_{ij}^2 = 75880.55$ (+2)

* I didn't teach stats this semester, Dr. Cori Mowrey did – and a damn fine job at that.

** This is actually Spring 2015 data, as I didn't start teaching this course every semester until Dave Kender retired. Just go with it.

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	f_0
Treatments	4.358	2	2.179	.094288
Error	207.99	9	23.11	-
Total	212.35	11	-	-

(+1) (values entered)

$SS_T = 75880.55 - \frac{952.9^2}{3 \cdot 4} = 212.35$ (+1) $3 \cdot 4 - 1 = 11$ d.o.f. (+1)

$SS_{Tr} = \frac{321.04^2 + 316.04^2 + 315.82^2}{4} - \frac{952.9^2}{3 \cdot 4} = 4.358$ (+1)

$SS_E = 212.35 - 4.358 = 207.99$ (+1)

$3 - 1 = 2$ d.o.f. (+1)

$3(4-1) = 9$ d.o.f. (+1)

$MS_{Tr} = \frac{4.358}{2} = 2.179$ (+1)

$MS_E = \frac{207.99}{9} = 23.11$ (+1)

$f_0 = \frac{2.179}{23.11} = 0.094288$ (+1) ha!

$f_{crit.} = f_{.05,2,9} = 4.26$ (+1) (table)

$f_0 \not> f_{crit.}$ (+1)

fail to reject H_0 (+1)