Statistical Hypothesis Test "Flow Chart" (QSCI 482 Winter 2013)

One population (sample)

Interval/Ratio Scale –

- Test of mean / location / central tendency –
  - Pop'n standard deviation known or large sample: *Z*-test (1, 3)
  - Pop'n standard deviation Unknown, small sample: *t*-test (4)
- Test of variance / dispersion: χ^2 variance test (6)
- Test of distribution: *K-S* test for continuous data (14)

Ordinal Scale –

- Test of "fit" of a uniform distribution for data in categories: *K-S* test for ordinal data (14.1)

Nominal Scale –

- Single factor affecting distribution of data among categories: χ^2 Goodness-of-fit test (15)
- Two or more factors affecting distribution among categories: χ^2 test of independence (17)

Two populations (samples)

Independent samples –

- Interval/Ratio scale –
  - Normal Distribution of data –
    - To detect difference in means / locations / central tendencies –
      - Equal variances: "standard" two-sample *t*-test (7)
      - Unequal variances: Welch's two-sample *t*-test (7-6)
    - Detect difference in variances / dispersions: *F*-test (variance ratio test) (9)
  - Non-normal Distribution of data –
    - Difference in means / locations / central tendencies: Mann-Whitney *U*-test (12)
    - Difference in variances / dispersions: Squared-Ranks test (12)
- Ordinal / Nominal scale –
  - Diff. between populations in data distribution over categories: χ^2 test of homogeneity

Paired (correlated or "blocked") samples –

- Normal Distribution of data: Paired *t*-test (10)
- Non-normally distributed data: Wilcoxon signed-ranks test (13)

Three or more populations (samples)

NOTE: Use factors with *fixed* effects to detect differences in *specific* treatment means;
Use *random* factors to identify sources of *variation* (variance components) in a larger population from which the studied treatments came

Completely Randomized Design (Independent Experimental Units) –	
Normal Distribution of data –	
Single "thing" (factor) affects treatment outcome:	One-way ANOVA (*F*-tests) (20)
Two (or more) factors affect treatment outcome:	Two (or higher)-way ANOVA (27)
Non-normal data, single factor:	Kruskal-Wallis test (30)
Randomized Block Design (associated / correlated Exptl. Units) –	
Normal distribution of data:	2-way ANOVA (*no interaction*) (29)
Non-normal data:	Friedman's test
Post-ANOVA analysis (which treatments are actually different?)	
Normal Distribution of data –	
All pair-wise comparisons:	Tukey's HSD (if CI's needed), or SNK (24)
Compare all treatments to control	Dunnett's test (25)
Data "snooping"	Scheffe's contrasts (26)
Non-Normal Distribution of data –	
All pair-wise comparisons:	Tukey analogues (30)
Compare all treatments to control	Dunnett's analogue (30)
Data "snooping"	Scheffe's analogue (30)