Mathematics & Statistics

Comprehensive Basics

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A comprehensive overview of the basics of mathematical and statistical convention, including practice and protocol from the equivalent of Scottish Higher to Undergraduate level

This writing features original content written by the author and much additional content adapted from writings of various other authors and institutions

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Abstract

Index terms:

Information

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I Base Material

I.1 The Greek Alphabet

Within mathematics and statistics, symbols from the Roman and Greek alphabets are referenced to denote hypothetical values. In conjunction with other miscellaneous characters, accents, relational symbols, operators, function syntax, delimiters, arrows, dots, array syntax and ordinal syntax; letters belonging to these alphabets appear throughout various notations. This paper does not exhaust their listing however, there is a LaTeX-based syntax guide available on my website for this purpose. A summary of the Greek alphabet is outlined below for your reference throughout this piece. Note that this list also extends to 'variations' (`var`) of these symbols, which are not typically used in mathematics. Or, which may be used interchangeably with their adjacent form. Some Greek symbols are indistinguishable from their Roman variants and are therefore, also rarely or not used.

A, α	Alpha, alpha	N, ν	Nu, nu
B, β	Beta, beta	Ξ, ξ	Xi, xi
Γ, γ	Gamma, gamma	O, o	Omicron, omicron
Δ, δ	Delta, delta	Π, π, ϖ	Pi, pi, varpi
E, ϵ, ε	Epsilon, epsilon, varepsilon	P, ρ, ϱ	Rho, rho, varrho
Z, ζ	Zeta, zeta	Σ, σ, ς	Sigma, sigma, varsigma
H, η	Eta, eta	T, τ	Tau, tau
Θ, θ, ϑ	Theta, theta, vartheta	Υ, υ	Upsilon, upsilon
I, ι	Iota, iota	Φ, ϕ, φ	Phi, phi, varphi
K, κ, $\varkappa$	Kappa, kappa, varkappa	X, χ	Chi, chi
Λ, λ	Lambda, lambda	Ψ, ψ	Psi, psi
M, μ	Mu, mu	Ω, ω	Omega, omega

Table I.1: The Greek Alphabet

I.2 Algebra

A Michael Mann Production

Dolby Stereo™ In Selected Theatres

Appendix 2: Foundational Material

Figure B2: Elementary Basics of Statistics

Variable Types	
Numerical	
Continuous	Infinite possible values. Real line or interval. E.g. page number on your Beamer slide show or; hh:MM:SS:ss – dd/mm.yyyy.
Discrete	Restricted possible values. Bound to lower and upper limit. E.g. number of lexer errors in TEX log when you try to use HTML shortcuts as opposed to basic Unicode shortcuts.
Categorical	
Ordinal	Ordered/sequenced and has meaning. E.g. gender, race, eye colour etc.; any type of group residence.
Regular	Ordered/sequenced and has no meaning. E.g. surname, forename.
Relationships	
Correlation	How variables move together (direction). Correlation $\neq$ Causation
Association	Intuitively connected but, perhaps, not correlated.
Dependence	Does correlatively rely on the movement of another variable.
Independence	Does not correlatively rely on the movement of another variable.
Data Collection	
Sample	Portion of population selected for analysis. Used to make assumptions and inference upon entire populations.
Population	Entirety of the group from which a sample is extracted.
Sampling Bias	
Non-Responsive	Only a small portion of a the proposed sample responded.
Voluntary Response	Irrational bias in opinions of people within sample.
Convenience	More accessibility leads to easier response. May lead to skewed results. E.g. a farming survey's results in Central Asia may be skewed towards commercial farming because of India (easier to survey), although subsistence farming is significantly more present in remote (harder to survey) areas such as Nepal; of which there is a larger quantity.
Observations	Conductor observes information and translates it to data (observations) from existing scenario.
Experiment	Conductor observes data from results of self-manufactured scenario.
Examining Data	
Scatter Plot	Plots scattered across a 2D x-axis/y-axis Allows for identification of relationship between x (explanatory axis) and y (response axis). E.g. linear (positive/negative), polynomial (varying by degree {quadratic, cubic, quartic, quintic, ...}) etc.
Bar Graph	Basic comparison of values (y-axis) of categories (x-axis).

Population Pyramids	Comparison of intervals (y-axis) across two categorical groups (x-axis 1, x-axis 2). Often used in human population.
Box Plot	Highlights minimum, first quartile, median, third quartile and maximum.
Distribution Moments	
Mean	$\mu = \frac{\Sigma x}{N}$ = Population Mean; $\bar{x} = \frac{\Sigma x}{n}$ = Sample Mean Common 'average' value. Supplies line of best fit in linear equations. Influenced by outliers so can be skewed.
Median	Central value in dataset. Neglects outliers, to a degree (hence, used for salary etc.) Finds quartile ranges: 0 - Q1 - Q2 - Q3 - N (IQR)
Standard Deviation	σ = Standard Deviation How much data deviates from the mean. Same units as the data.
Variance	σ^2 = Variance Fairly weighted measure of variation from the mean. Discards negatives, weights higher deviations more.
Covariance	$\text{cov}_{x,y} = \sigma_x \sigma_y \rho_{x,y}$ = Covariance Variation of members of the dataset, relative to others.
Correlation	$\rho_{x,y} = \frac{\text{cov}_{x,y}}{\sigma_x \sigma_y}$ = Correlation If ρ = 1: Perfect Positive Correlation (Together) If ρ = -1: Perfect Negative Correlation (Apart) If ρ = 0: No Correlation Correlation Matrices map all possible movements together.
Skewness	Degree of asymmetry around the mean. **Symmetric:** assume mean in centred. {mean $\approx$ median}; {skewness $\approx$ 0} **Left Skewness:** tail to left {Negative Skewness $<$ 0} {mean $<$ median}; Positive Distribution **Right Skewness:** tail to right {Positive Skewness $>$ 0} {mean $>$ median}; Negative Distribution
Kurtosis	Measure of the peak of the data; likelihood of extremes. 'Excess Kurtosis': how peaked the data is relative to the normal distribution. Excess Kurtosis = $k - 3$ (Generally, $\{k - 3 = 1\}$ is significant) **Leptokurtic:** above Normal Distribution - skinny/high tails. {Excess Kurtosis $>$ 0; $k < 0$}; Positive Excess Kurtosis **Platykurtic:** below Normal Distribution - fat/low tails. {Excess Kurtosis $<$ 0; $k > 0$}; Negative Excess Kurtosis **Mesokurtic:** Normal Distribution {Excess Kurtosis = 0; $k = 0$}; Normal Distribution
Modality	**Unimodal:** 1 peak **Bimodal:** 2 peaks **Multimodal:** more than 2 peaks; n peaks **Uniform:** No peaks (outcomes have equal probabilities)
Types of Economic Data	
Cross-Section	Observations of different units, over the same time period. R_i for $i \in \{1, 2, ..., N\}$; $\forall$ N unit observations. E.g. returns of 226 companies over 69/62/26.

Time-Series	Observations of the same unit, over different times periods.
	$\mathrm{R_t}$ for $\mathrm{t} \in \{1, 2, ..., \mathrm{T}\}$; $\forall$ T time periods.
	E.g. returns of 1 company over 69/62/26 - 22/66/96.
Panels	Observations of different units, over different time periods.
	$\mathrm{R_{it}}$ for $\begin{Bmatrix} i \in \{1, 2, ..., N\} \\ t \in \{1, 2, ..., T\} \end{Bmatrix}$
	E.g. returns of 226 companies over 69/62/26 - 22/66/96.

Figure B3: Regression Modelling Basics (Expansive)

Model Types

Standard Ordinary Least Squares (OLS) Multiple Regression

$$\mathrm{Y_t} = \alpha + \sum_{\mathrm{k}=1}^{\mathrm{K}} \beta_{\mathrm{k}} \mathrm{X_k} + \varepsilon_{\mathrm{t}}$$

$$\vee \ \mathrm{Y_t} = \alpha + \beta_1 \mathrm{X_1} + \beta_2 \mathrm{X_2} + ... + \beta_{\mathrm{K}} \mathrm{X_K} + \varepsilon_{\mathrm{t}}$$

For N observations; dependent (response) variable Y; k independent (explanatory) (X) variables; random error ε_{t} ($\varepsilon_i = (Y_i - \hat{Y}_i)$, each observation has a predicted $\hat{Y}_i$ on the line of best fit, directly above or below its real Y_i, distance between each of these value is the *error*) and; time t (Wooldridge, 2012). For $\mathrm{k} \in \{1, ..., \mathrm{K}\}$ and $\mathrm{t} \in \{1, ..., \mathrm{N}\}$.

β_1 is the marginal effect of $\mathrm{X_1}$ on Y, ..., β_{K} is the marginal effect of $\mathrm{X_K}$ on Y. Hence, $\beta = \frac{\Delta Y}{\Delta X} = \frac{\partial Y}{\partial X}$

This is a *Linear Regression* which uses a straight 'line of best fit' (hyperplane). For non-linear data, a *Polynomial Model* can be used to account for concave/convex data. Hence: $Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2^2 + ... + \beta_K X_K^K + \varepsilon_i$

Assumptions of a standard OLS Regression:

[1] $\Sigma\varepsilon_{\mathrm{i}} \cong 0$

The sum of all residuals should approximately zero, meaning the degree to which observations outlie the line of best fit should be consistent. Errors should be minimised to satisfy min $\left\{\Sigma_{\mathrm{i}=1}^{\mathrm{N}} \varepsilon_{\mathrm{i}}^2 = \Sigma_{\mathrm{i}=1}^{\mathrm{N}} \left(\mathrm{Y_i} - \hat{\mathrm{Y}}_{\mathrm{i}}\right)^2\right\}$ for $\hat{\alpha} = \hat{\beta}_0$; $\hat{\beta} = \hat{\beta}_1$

[2] $\mathrm{var}(\varepsilon_{\mathrm{i}}) = \mathrm{E}(\varepsilon_{\mathrm{i}}^2) = \sigma^2$

All observations have constant errors, meaning that the variance of the residuals is constant. Therefore, they are homoskedastic; no need for a heteroskedasticity test (White, 1980) or the adjustment to a robust model.

[3] $\mathrm{cov}(\varepsilon_{\mathrm{i}}, \varepsilon_{\mathrm{j}}) = 0$ (for $\mathrm{i} \neq \mathrm{j}$)

Error terms uncorrelated with one another; observations are exogenous ($\mathrm{X_1}$ does not cause changes in $\mathrm{X_2}$), not endogenous. There is no need for Instrumental Variable approach. No endogeneity problem.

ARCH Stochastic Time-Series Model

$$\mathrm{Y_t} = \alpha + \mathrm{Y_{t-1}} + \varepsilon_{\mathrm{t}} \rightarrow \Delta\mathrm{Y_t} = \alpha + \varepsilon_{\mathrm{t}}$$

Referring to $\mathrm{Y_t}$, stock prices increase by an average of α each period but are otherwise unpredictable due to variation ε_{t} (Engle, 1982). Meaning that stock returns (referring to $\Delta\mathrm{Y_t}$; "a stock return is the change in stock price") are on average α but are unpredictable due to error ε_{t}.

We observe lagged variables ($\mathrm{Y_{t-1}}$) and therefore must ensure no autocorrelation between them and the dependent variable as such: $\rho = \mathrm{corr}\left(\mathrm{Y_t}, \mathrm{Y_{t-1}}\right)$. This takes form of the Autoregressive(1) (AR(1)) which allows unit-root tests which aim to identify stationarity, ensuring zero-mean, constant variance, no seasonality. Hence, testing for ($|\rho| < 1$). They're frequently referred to as tau-tests, also ensuring coefficients have a t-distribution and produce accurate t-stats and p-values. This follows:

$$\mathrm{Y_t} = \alpha + \rho \mathrm{Y_{t-1}} + \varepsilon_\mathrm{t}$$

Extended to the Autoregressive(p) (AR(p)) model for p time stamps in period T:

$$\mathrm{Y_t} = \alpha + \rho_1 \mathrm{Y_{t-1}} + ... + \rho_\mathrm{p} \mathrm{Y_{t-p}} + \varepsilon_\mathrm{t}$$

Furthermore, for modelling financial time-series, the above is transformed into the Autoregressive Conditional Heteroskedasticity (ARCH) model (Bollerslev, 1986). This accounts for return volatility and an error function as follows:

$$\mathrm{Y_t} = \alpha + \beta_1 \mathrm{X_{1t}} + ... + \beta_\mathrm{k} \mathrm{X_{k1}} + \varepsilon_\mathrm{t}$$

$$\sigma_\mathrm{t}^2 = \mathrm{var}(\varepsilon_\mathrm{t}) = \gamma_0 + \gamma_1 \varepsilon_\mathrm{t-1}^2 + ... + \gamma_\mathrm{p} \varepsilon_\mathrm{t-p}^2$$

$$\varepsilon_\mathrm{t} = f(\varepsilon_\mathrm{t-1}, \varepsilon_\mathrm{t-1}, ..., \varepsilon_\mathrm{t-p})$$

Dummy Variables

Dummy variables are used to alter a sample according to a binary criteria (Wooldridge, 2003). A dummy (D) is placed in the model with a value of 1 or 0. For example, when isolating males and females. This alters the *y-intercept* according to each in question thus, changing the premium. For example:

$$\mathrm{Y_t} = \alpha + \beta_1 \mathrm{X_1} + \tau \mathrm{D_t} + \varepsilon_\mathrm{t}$$

$\mathrm{D_t} = 0$: $\mathrm{Y_t} = \alpha + \beta_1 \mathrm{X_1} + \tau \mathrm{D_t} + \varepsilon_\mathrm{t}$;
$\mathrm{D_t} = 1$: $\mathrm{Y_t} = \alpha + \beta_1 \mathrm{X_1} + \tau + \varepsilon_\mathrm{t} = (\alpha + \tau) + \beta_1 \mathrm{X_1} + \varepsilon_\mathrm{t}$

Measures of Model Integrity

[1] $\mathbf{R^2}$ Value: Basic model integrity. The degree of explanation a selection of variables has regarding the chosen dependent variable.

[1.1] Standard R^2: Used in the case of single regression.

The R^2 value of 0.2672 suggests the explanatory variable is responsible for and can statistically explain 26.72% of the variation in Y or; variation in Y is 26.72% attributable to the explanatory variable.

[1.2] Adjusted R^2 Value: Same as the former. Used in the case of multiple regression.

The R^2 value of 0.5672 suggests the collection of explanatory variables are responsible for and can statistically explain 56.72% of the variation in Y or; variation in Y is 56.72% attributable to the collection of explanatory variables.

[2] Omitted Variable Bias: When one or more variables which could have an effect on Y are omitted from the model. This may happen when omitting variables in search of better p-values. Some explanation may be omitted.

[3] Information Criteria: One way of selecting an optimal model is by finding the one with the lowest possible Schwartz Information Criterion, Akaike Information Criteria and/or Hannan-Quinn Information Criteria.

[4] f-test: Validity of the set of variables in explaining the dependent variable. Validity of the set of instruments also, in the case of an Instrumental Variable approach.

H_0: $R^2 = 0$; the model is not statistically significant

p-value > 0.05: fail-to-reject; the model is not statistically significant
p-value < 0.05: reject; the model is statistically significant at <*relevant*> level

[5] RESET Test: Tests whether non-linear explanatories, such as polynomials and logarithms, assist in explaining the dependent variable. I.e. is your model well- specified? Hypothetically adds gamma coefficients to hypothetical polynomials and logs in the model. Try different selections of polys and logs and compare RESET results. Seek combination with highest possible p-value.

Aim to fail-to-reject (if not in desire of polys and logs):
H_0: Polynomials and logarithms do not aid explanation of Y

p-value desire flips with regards to hypothesis symmetry:
p-value > 0.05: fail-to-reject; polynomials and logarithms do aid explanation of Y
p-value < 0.05: reject; polynomials and logarithms do not aid explanation of Y

[6] Endogeneity Test: The 'Hausman Test' is often used. Random unaccounted explanatories may be correlated with ε so, the Instrumental Variable approach accounts for unknown coefficients where its variable is correlated with ε.

Endogeneity: factors in model cause ΔX, ΔX associated w/ $\Delta\varepsilon$
Exogeneity: factors in model don't cause ΔX, ΔX not associated w/ $\Delta\varepsilon$

Aim to fail-to-reject:
H_0: Explanatory variables uncorrelated with ε; no endogeneity problem

p-value desire flips with regards to hypothesis symmetry:
p-value > 0.05: fail-to-reject; no endogeneity problem present
p-value < 0.05: reject; endogeneity problem present; need IV approach

[7] Heteroskedasticity Test: The 'White Test' is often used. Often referred to as 'robustness test' finding need for robust standard errors. When there're non-constant error terms (heteroskedasticity), OLS poorly fits a suitable line through the data.

Homoskedastic Errors: constant error terms/error variance
Heteroskedastic Errors: non-constant error terms/error variance

Aim to fail-to-reject:
H_0: There is homoscedasticity present; there are constant error terms

p-value desire flips with regards to hypothesis symmetry:
p-value > 0.05: fail-to-reject; there is no heteroskedasticity present; errors are constant
p-value < 0.05: reject; there is heteroskedasticity present; errors are non-constant

[8] Unit-Root Test: This may be found under various names including 'tau-test', 'unit-root test', 'Augmented Dickie-Fuller Test' etc. However, people frequently make the same mistake with these terms as they do when referring to 'terminal', 'terminal emulator' 'command line', 'shell' and 'Bash/zsh', for example.

A 'unit-root' is a possible characteristic of stochastic trend for example, when there's a random walk. A 'unit-root' test aims to identify whether there is stationarity in a stochastic model. Stationarity requires: [1] constant mean, [2] constant variance, [3] no seasonality. The 'Dickie-Fuller Test' is the creator-based name given to a test for a unit-root, using a tau test-statistic (τ-statistic) hence, 'tau-test'. If Y is non-stationary, ϕ lacks a t-distribution so p-values/t-stats of t-tests are inaccurate. Syntax follows: 'Y is stationary/non-stationary'.

[8.1] The 'Dickie-Fuller Test' is used for single-explanatory models, commonly AR(1):
Recall: $\mathrm{Y_t} = \alpha + \rho \mathrm{Y_{t-1}} + \varepsilon_\mathrm{t}$
Testing Regression: $\Delta \mathrm{Y_t} = \alpha + \phi \mathrm{Y_{t-1}} + \varepsilon_\mathrm{t}$

$\mathrm{H_0}$: $\phi = 0 \Rightarrow \{\rho = 1 \Rightarrow \phi = (\rho - 1)\}$; there is a uni-root present

p-value > 0.05: fail-to-reject; $\{\phi = 0 \Rightarrow \rho = 1\}$; Y non-stationary; unit-root present
p-value < 0.05: reject; $\{\{-2 < \phi < 0\} \Rightarrow \{-1 < \rho < 1\}\}$; Y stationary; no unit-root

[8.2] The 'Augmented Dickie-Fuller Test' follows the same principals and is used for multiple-variable models. Variables which present stationarity can be used. Syntax amendment follows: 'Y is stationary/non-stationary about the trend of X'. The 'Augmented Dickie-Fuller Test' extends the testing methods to AR(p):

Recall: $\mathrm{Y_t} = \alpha + \rho_1 \mathrm{Y_{t-1}} + ... + \rho_\mathrm{p} \mathrm{Y_{t-p}} + \varepsilon_\mathrm{t}$
Testing Regression: $\Delta \mathrm{Y_t} = \alpha + \phi \mathrm{Y_{t-1}} + \gamma_1 \Delta \mathrm{Y_{t-1}} + ... + \gamma_\mathrm{p} \Delta \mathrm{Y_{t-p}} + \delta \mathrm{t} + \varepsilon_\mathrm{t}$

$\mathrm{H_0}$: $\phi = 0 \wedge \delta = 0$; there is a uni-root present

p-value > 0.05: fail-to-reject; Y non-stationary around trend; unit-root present
p-value < 0.05: reject; Y stationary around trend; no unit-root

FIGURE B4: REGRESSION RESULTS INTERPRETATION

	Coefficients	
(+)	X and Y positively related and move in the same direction.	
(−)	X and Y negatively related and move in opposing directions.	
	Numerical Continuous Dependent Variable	
Continuous Explanatory	For a 1 unit change in X, there is a *<coefficient>* change in Y.	*"For a 1 unit increase in management fee, there is a <coefficient> change in hedge fund value."*
Binary Explanatory	X being Binary 1 results in a *<coefficient>* difference in Y over X being Binary 0.	*"A fund with a high-water mark has a <coefficient> different value from a fund without one."*
	Binary Dummy Dependent Variable	
Continuous Explanatory	For a 1 unit change in X, the odds of Y being Binary 1 changes by *<coefficient>* units.	*"For a 1 unit increase in management fee, the odds of a hedge fund being defunct changes by <coefficient> units."*
Binary Explanatory	X being Binary 1 results in the odds of Y being Binary 1 by *<coefficient>* different units over X being Binary 0.	*"A fund with a high-water mark is <coefficient> differently probable of being defunct than a fund without one."*
	Respective Numerical Examples (Coefficient = 0.226)	
"For a 1 unit change in management fee, there is a 0.226 unit increase in hedge fund value."		
"A hedge fund with a high-water mark has a 0.226 unit greater value than one without one."		
"For a 1 unit increase in management fee, the odds of a hedge fund being defunct increases by 0.226 units."		
"A hedge fund with a high-water mark is 0.226 units more probable of being defunct than one without one."		

Figure B5: Hypothesis Testing Basics (Expansive)

Hypotheses
H_0: Null Hypothesis *Aim to Reject; may Fail-to-Reject; rarely Accept* **H_A:** Alternative Hypothesis *Favour in the case of Rejection of the Null*
Type I Error: Rejection of null hypothesis when it is true **Type II Error:** Failure-to-reject null hypothesis when it is false
Reduce Type I Error Risk: Reduce significance level; harder to reject null **Reduce Type II Error Risk:** Use large sample; ensuring significant spread
Probability α: Probability of making Type I Error **Probability** β: Probability of making Type II Error

Error Examples		
Decision	H_0 is True (Accused is Innocent)	H_0 is False (Accused is Guilty)
Reject H_0 (Accused Convicted)	**WRONG** Decision (Type I Error) Probability α	**CORRECT** Decision
Fail-To-Reject H_0 (Accused Goes Free)	**CORRECT** Decision	**WRONG** Decision (Type II Error) Probability β

Figure B6: t-stat & p-value Interpretation

t-stat
t-stat $= \frac{\bar{x}-\bar{\mu}}{\left(\frac{\sigma}{\sqrt{N}}\right)}$ |**t-stat**| > 1.96: reject the null hypothesis at the 5% significance level; |**t-stat**| > 2.58: reject the null hypothesis at the 1% significance level *Given 1000 degrees of freedom*
p-value
p-value < 0.05: reject the null hypothesis at the 5% significance level; **p-value** < 0.01: reject the null hypothesis at the 1% significance level *Given 1000 degrees of freedom*
Confidence Relevance
5% and 1% significance levels are also referred to as the 95% and 99% confidence [in rejecting the null] intervals. Correct syntax: refer to 5% and 1% significance levels when referring to p-values; 95% and 99% confidence levels when referring to hypotheses.
Error Relevance
5% and 1% levels are used to ensure accuracy and reduced probability of making a Type I error. That is, “accepting a max 5%/1% chance that you are wrong when rejecting the null”; “you are min 95%/99% confident you are right when rejecting”.

Figure B7: Linguistics of 'LaTeX'

LaTeX (or LaTeX, even latex (Donald E. Knuth's more recent installment of TeX)) is usually pronounced /laːtɛk/ ('lah') or /leɪtɛk/ ('lei'/'lay') in English (that is, not with the /ks/ pronunciation English speakers normally associate with X, but with a /k/). The characters T, E, X in the name come from capital Greek letters tau, epsilon, and chi, as the name of TeX derives from the Greek: $\tau\varepsilon\chi\nu\eta$ (skill, art, technique, precision); for this reason, Donald E. Knuth promotes a pronunciation of /tɛk/ (tekh) (that is, with a voiceless velar fricative as in Modern Greek, similar to the last sound of the German word "Bach", the Spanish "j" sound, or as "ch" in a Scottish 'loch').

Figure B8: Don. Knuth's Computer Modern Unicode (CMU) Font Family

Serif	**Sans Serif**	**Monospaced**
CMU Serif Roman	CMU Sans Serif	`CMU Concrete`
CMU Serif Bold	**CMU Sans Serif Bold**	
CMU Serif Italic		*`CMU Concrete Italic`*
CMU Serif Oblique	*CMU Sans Serif Oblique*	*`CMU Concrete Oblique`*
CMU Serif Small Caps		`CMU Concrete Small Caps`

In the presence of traditionalists, a suitable alternative to Donald E. Knuth's Computer Modern Unicode font family may be considered: Andale Mono.

Figure B9: Why My Pre-Title's Right and You're Wrong

I have received numerous comments which anyone would regard naïve and under-educated regarding my pre-title of this study: *AG436 Dissertation Coursework Assignment*. The argument originates in the 'Coursework Assignment' portion. People argue that a dissertation 'is not'/'does not have' an assignment. Not only is this poor characteristic recognition, it is semantically wrong. *AG436: Dissertation* is a class just like any other. However under this class, there are no lectures, no tutorials and therefore no exams as there is no [taught] content. Do not confuse this with the class 'having no content' though. AG436's content is apparent through literature of the student's choice. Therefore, it is possible for a 'coursework assignment' to be based on this. Hence, any further comments are null.

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