ATHK1001 Analytical Thinking

Unit of Study Code: ATHK1001

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Format of Unit: 3 x 1 hour lectures/week x 13 weeks
• Tuesday 1pm, Thursday 1pm, Friday 12pm
• Wallace Theatre
1 x 2 hour tutorial/week x 12 weeks

Credit Point Value: 6 Credit Points

Prerequisite: None
Assessment:

Classwork (40%):

Data Concepts and Management

Tutorial test (10% of the total mark),
Date: Week 5 (Tutorial 4), Held in your tutorial

Logic and Critical Reasoning

750 word assignment (10% of the total mark),
Due Date: Week 10, Friday 14 May

Analysis and Interpretation

2 page assignment (10% of the total mark),
Due Date: Week 13, Submitted in your tutorial

Tutorial participation (10% of the total mark)

Examination (60%):

Multiple choice questions for Data Concepts and Management (33.3%), multiple choice questions for Analysis and Interpretation (33.3%), and short-answer questions for Logic and Critical Reasoning (33.3%).

Out of class prescribed student workload:

Data collection for Analysis and Interpretation assignment; practical, tutorial and lecture preparation/readings

Unit of study general description:

Analytical Thinking is a course covering aspects of reasoning, logic, data handling, interpretation of data analysis, and understanding of relationships between variables. It is comprised of three equally weighted sections: Data Concepts and Management, Logic and Critical Reasoning, and Analysis and Interpretation. The section on data concepts and management covers aspects of surveying, summarising information, data handling, and critiquing the validity of different types of data collection and summary. The logic and critical reasoning section covers material ranging from the structure of an argument to critiques of case studies based on different areas of argument. In analysis and interpretation, the initial two components are drawn together to show how arguments are formed regarding data, and how these create a foundation for scientific research.

EVIDENCE OF LEARNING

Data Concepts and Management
Assessment will take the form of a 30 minute in class tutorial test (held in Week 5) based on all preceding lecture and tutorial material. One third of the final examination will further assess knowledge of lecture and tutorial material.

Logic and Critical Reasoning
This section will be assessed via a 750 word assignment (due in Week 10). One third of the final examination will further assess knowledge of lecture and tutorial material.
Analysis and Interpretation
A two-page report (due in Week 13) will assess the skills that are the focus of this section of the course. One third of the final examination will further assess knowledge of lecture and tutorial material.

Graduate Attributes and Student Learning Outcomes for Analytical Thinking

Graduate Attributes are generic attributes that encompass not only technical knowledge but additional qualities that will equip students to be strong contributing members of professional and social communities in their future careers. The overarching graduate attributes identified by the University relate to a graduate’s attitude or stance towards knowledge, towards the world, and towards themselves. These are understood as a combination of five overlapping skills or abilities, the foundations of which are developed as part of specific disciplinary study.

1: Research and Inquiry
Graduates of the University will be able to identify and analyse problems, and be both creative and principled thinkers within their discipline.

Student learning outcomes for Analytical Thinking:

(i) Demonstrate the ability to critique the arguments of others.
(ii) Exercise logic and reasoning in the formation of arguments.
(iii) Understand and evaluate the quality of data based on its sources and the manner in which it was obtained.
(iv) Identify the best way of approaching the exploration of a research question.
(v) Demonstrate the ability to design an empirical investigation, taking account of the research question, feasibility issues in data collection, and issues of validity in data collection and analysis.

2: Information Literacy
Graduates of the University will be able to use information effectively in a range of contexts.

Student learning outcomes for Analytical Thinking:

(i) Demonstrate an understanding of different types of variables and the ways in which they can be used.
(ii) Demonstrate the ability to identify premises of arguments and evaluate these.
(iii) Demonstrate the ability to use basic spreadsheet software to create effective and accurate summaries of information.
(iv) Understand potential sources of bias in information.
(v) Understand the limitations of a source of information and incorporate this into the way in which that information is used.

3: Personal and Intellectual Autonomy
Graduates of the University will be able to work independently and sustain an attitude of openness and capacity to meet new challenges.

Student learning outcomes for Analytical Thinking:

(i) Demonstrate an active participation in debate and discussion.
(ii) Demonstrate the ability to work independently and as a member of a group of students.
(iii) Show a willingness to engage with unfamiliar problems.
(iv) Demonstrate the ability to regulate learning independently by using course resources appropriately.

4: Ethical, Social and Professional Understanding
Graduates of the University will hold personal values and beliefs consistent with their role as responsible members of local, national, international and professional communities.

Student learning outcomes for Analytical Thinking:
(i) Recognise the ethical requirements of academic research and discourse.
(ii) Respect and support the practice of sound data collection and analysis.
(iii) Respect and uphold the value of diversity in opinions and beliefs.
(iv) Uphold the value of honesty, transparency, and rigour in all academic pursuits.

5: Communication
Graduates of the University will use and value communication for negotiating, creating new understanding, interacting with others, and furthering their own learning.

Student learning outcomes for Analytical Thinking:
(i) Participate in verbal discussion and debate in tutorials.
(ii) Submit two pieces of formal writing during the course in the form of assignments.

SYLLABUS

Data Concepts and Management

Structure of academic inquiry
Introduction to the general process of investigation, be it theoretical or empirical. Understanding of data as evidence, and thus critical to overall process of investigation.

Sources of data
Understanding of the ways in which bias may be introduced into data. Introduction to the concepts of validity of interpretations and conclusions. Introduction to types of error and best practice for managing these.

Numerical and graphical summaries
Introduction to basic types of variables and to the concept of appropriate and inappropriate summaries. Introduction to basic numerical summaries of central tendency and variability. Introduction to standard graphical summaries for individual variables and combinations of variables.

Data storage and manipulation
Introduction to spreadsheet software. Foundational elements of storage and retrieval of data. Using spreadsheet software to create graphs. Using spreadsheet functions to create summaries and new variables.

Logic and Critical Reasoning
Elements of argument
Introduction to the structure of arguments and explanations. Logical connectives, truth tables and deductive validity and soundness. The role of meaning and definition in argument.

Non-Deductive Argument
Induction and inductive scepticism. Distinguishing causation from correlation. Reasoning with conditional probabilities.

Case Studies

Analysis and Interpretation

Research questions and hypotheses
Introduction to the issues of quality and specificity of research questions, and links from these to specific research hypotheses. Introduction to null and alternative hypotheses. Introduction to the overarching process of hypothesis testing. Brief coverage of research design and how this draws together aspects of research questions, hypotheses, testing, and analysis procedures.

Distributions
Recognition of the normal distribution and familiarity with its basic properties. Introduction to other forms of distribution.

Statistical testing
Introduction to the general form of a statistical test. Conceptual overview and interpretation of results from the t-test for a single mean, the related-samples t-test, the independent samples t-test, one-way ANOVA, Chi-square goodness of fit test, correlation, and regression.

Ethics for analysis

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<td>Telling stories in Science</td>
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<td>Tutorial 3: Combining information from two variables</td>
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* Note that attendance and participation in tutorials is compulsory and is worth 10% of the final mark.
School of Psychology Plagiarism Policy information for Students

**Plagiarism is not permitted**

i) Are you sure you know what plagiarism is?
Please refer to the University policy on plagiarism:

ii) The School of Psychology will penalise all submitted work that is plagiarised;

iii) The School of Psychology is using software to detect all forms of plagiarism.

Note that procedures for assessment are very strict and failure to comply with these can result in serious penalties. Every piece of assessment you hand in must be the work of you and nobody else. If you do not attend a scheduled test or examination and have not applied for Special Consideration, you will not receive any marks for that item of assessment. If any student’s submitted work is detected to include plagiarism, they will receive NO marks for any plagiarised sections, and may be deemed to be ineligible to pass the course. For this unit of study, you are expected to have read and to comply with the Psychology Administration Guidelines (http://www.psych.usyd.edu.au/teach/09_PsychologyAdministrationGuidelines.pdf). Being unaware of this information will not be considered an acceptable excuse for breaching any rules regarding assessment.

For full details of the University of Sydney Plagiarism Policy, see http://www.usyd.edu.au/senate/policies/Plagiarism.pdf

For complete information on Special Consideration, see http://www.psych.usyd.edu.au/teach/09_PsychologyAdministrationGuidelines.pdf
RESOURCES

The textbook for this course is an abridged version of Seeing Through Statistics by J.M. Utts. It is available for approximately $72 at the Coop Bookshop.

Additional reading material will be available from the Library, on Special Reserve. To find the material relevant to this course, search for “ATHK1001” at http://opac.library.usyd.edu.au/search/r.

Location of the Coop Bookshop:
Sydney Uni Sport & Aquatic Centre, Building G09
Cnr Codrington Street & Darlington Road
University of Sydney NSW 2006

The course website contains additional resources and information. You should become familiar with the website and consult it first if you have any questions regarding the course. You can access the website by using your UNIKEY to log on to WebCT. Analytical Thinking will then appear as one of the units of study to which you have access. To got to WebCT, either follow the links for the University home page, or use the address below.

WebCT: https://learn-on-line.ce.usyd.edu.au/webct/entryPageIns.dowebct