ATHK1001 Analytical Thinking

Unit of Study Code: ATHK1001

Coordinator: Dr Bruce Burns
Office: Room 512 Griffith Taylor Building
Phone: 9351 8286
E-mail: bruce.burns@sydney.edu.au

Other lecturing staff: James Ley
Office: TBA
E-mail: james.ley@sydney.edu.au

Format of Unit: 3 x 1 hour lectures/week x 13 weeks
1 x 1 hour tutorial for 13 weeks

Credit Point Value: 6 Credit Points

Prerequisites: None

Assessment:

Assignment 1* (15% of the total mark) 750 word assignment
Due Date: BEFORE 4pm, Friday 17th April – Week 6 (online submission)

Assignment 2* (20% of the total mark), 1000 word assignment
Due Date: BEFORE 4pm, Friday 15th May – Week 10 (online submission)

Mastery quizzes (10% of the total mark): Every two weeks an on-line mastery quiz is due. Each quiz is worth 2% and can be done as often as you like. Your final score is your best score. Only your five best quizzes count towards the 10% total. The primary goal of these quizzes is to encourage you to engage continuously with the course material.

Tutorial participation (5% of the total mark)
You must attend 80% or more of your tutorial classes to obtain any part of this 5%, else you will receive 0 for this part of the assessment. NB: IT IS YOUR RESPONSIBILITY TO ATTEND THE TUTORIAL YOU ARE ENROLLED IN TO BE MARKED AS PRESENT.

Final Examination* (50% of the total mark):
Multiple choice questions for Data Concepts and Analysis (40%), multiple choice questions for Thinking Tools (30%), and short-answer questions for Logic and Critical Reasoning (30%)

Out of class prescribed student workload: Extra practice exercises associated with lectures and tutorials will be assigned and students are also expected to work towards their assessment tasks.

* Completion of these assessments is compulsory to pass this unit. Students who fail to complete any of these components will receive an Absent Fail grade, regardless of their marks in other assessments.

NB: This course is administered by the School of Psychology. It is very important that you read their general administrative guidelines for submission of written work, penalties for late work, assessment criteria, procedures for applying for extensions and special consideration in the Undergraduate Student Guide available on eLearning or via the link below:

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Unit of study general description:
Analytical Thinking is a course covering aspects of reasoning, logic, data handling, research design, interpretation of
data analysis, and understanding of relationships between variables. It is comprised of three sections: Data Concepts and Analysis, Logic and Critical Reasoning, and Thinking Tools. The section on data concepts and analysis covers aspects of research design, data collection, literature review and basic forms of hypothesis testing are statistical tests are introduced. The logic and critical reasoning section covers material ranging from valid and invalid forms of argument and errors in reasoning to critiques of arguments presented in case studies. The thinking tools section looks at the errors people make in reasoning, decision making and problem solving and how to avoid these errors. Together, the three course components teach foundational skills necessary for carrying out meaningful academic discussions, arguments, and research studies, which may be applied to any content area of enquiry.

Graduate Attributes and Student Learning Outcomes for Analytic Thinking
Graduate attributes are generic skills 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) Identify errors in thinking and how to avoid them.

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) Understand potential sources of bias in information.
(iv) 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 identify with and respond to unfamiliar problems.
(iv) Demonstrate the ability to regulate learning independently by using course resources appropriately.
(v) Demonstrate the ability to autonomously direct inquiry for the purpose of answering an empirical question

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 Skills
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) Active participation in tutorials
Evidence of learning

Data Concepts and Analysis
Assessment will take the form of a 750 word assignment, which will focus on research skills. It will be based on skills taught in lectures and tutorials in the first third of the course. 40% of the final examination will further assess knowledge of lecture and tutorial material.

Logic and Critical Reasoning
This section will be assessed via a 1000 word assignment requiring students to apply critical reasoning skills and demonstrate mastery of these. 30% of the final examination will further assess knowledge of lecture and tutorial material.

Thinking skills
30% of the final examination will assess knowledge of lecture and tutorial material from this section.

SYLLABUS

Data Concepts and Analysis

Structure of academic inquiry
Introduction to the general process of investigation, be it theoretical or empirical. Understanding research questions and the types of empirical studies to which these may lead. Learning to pose good research questions and to design studies addressing them. Introduction to research ethics.

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 basic numerical summaries of central tendency and variability.

Hypotheses and Statistical testing
Introduction to null and alternative hypotheses for research. 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. Introduction to the general form of a statistical test.

Logic and Critical Reasoning

Elements of argument
Introduction to the structure of arguments and explanations. Identifying 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

Thinking Tools

Reasoning, decision making and problem solving
Introduction to what research into thinking tells us about the errors in reasoning, how to be better decision makers and how to approach new problems.

Effective learning
Applying what we know about memory and skill acquisition to formulate principles for how people learn most effectively.
<table>
<thead>
<tr>
<th>WEEK (begin)</th>
<th>LECTURES</th>
<th>TUTORIALS</th>
<th>Due dates</th>
</tr>
</thead>
</table>
| 1 (2/3)     | 1. Why study analytic thinking?  
              2. Scientific method  
              3. Finding what is known | Tutorial 1: Orientation | Quiz 1 due by 4pm 6/3 |
| 2 (9/3)     | 4. Trustworthy data  
              5. Bias & error  
              6. Sampling | Tutorial 2: Formulating research questions | |
| 3 (16/3)    | 7. Quantitative data  
              8. Qualitative data  
              9. Study types | Tutorial 3: Ethics in research | Quiz 2 due by 4pm 20/3 |
| 4 (23/3)    | 10. Drawing conclusions  
              11. The hypothesis  
              12. Significant differences | Tutorial 4: Instructions for Assignment 1 | |
| 5 (30/3)    | 13. Analysing means  
              14. Analysing categorical data  
              15. Correlational data | Tutorial 5: Testing hypotheses | Quiz 3 due by 4pm 3/4 (Good Friday) |
| (6/4)       | NON-TEACHING WEEK | | |
| 6 (13/4)    | 16. Arguments and Explanations  
              17. Conditionals and Counterexamples  
              18. Deduction, Validity and Soundness | Tutorial 6: Statistical tests | Assignment 1 due 4pm 17/4 |
| 7 (20/4)    | 19. Bi-conditionals & Definition  
              20. Induction & Inductive Scepticism  
              21. Abductive Arguments | Tutorial 7: Arguments, Conditionals, Deduction | Quiz 4 due by 4pm 24/4 |
| 8 (27/4)    | 21. Arguments by Analogy  
              22. Fallacies  
              23. More Fallacies | Tutorial 8: Definitions, Induction | |
| 9 (4/5)     | 24. Causal Explanations  
              26. Probabilistic Reasoning | Tutorial 9: Fallacies | Quiz 5 due by 4pm 8/5 |
| 10 (11/5)   | 28. Introduction to Thinking Skills  
              29. Reasoning errors  
| 11 (18/5)   | 31. Heuristics and biases  
              32. Decision making 1  
              33. Decision making 2 | Tutorial 11: Reasoning | Quiz 6 due by 4pm 22/5 |
| 12 (25/5)   | 34. Problem solving 1  
              35. Problem solving 2  
              36. Creativity | Tutorial 12: Decision making | |
| 13 (1/6)    | 37. Improving thinking and learning 1  
              38. Improving thinking and learning 2  
              39. Big data | Tutorial 13: Data and reasoning | Quiz 7 due by 4pm 5/6 |

Note that lecture titles may be subject to change. In the unlikely event that due dates for any assessment change you will be informed in good time by e-mail, postings on the courses e-learning site, and in lecture.

TEXTBOOKS

No set textbook. Recommended readings and associated materials will be posted on the elearning site?
### ATHK1001 Assessment Summary

<table>
<thead>
<tr>
<th>What?</th>
<th>When?</th>
<th>When Returned?</th>
<th>% Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1</td>
<td>Online – <strong>BEFORE</strong> 4pm, Friday 17th April</td>
<td>On-time submissions returned at 4pm Friday 15th May*</td>
<td>15%</td>
</tr>
<tr>
<td>Compulsory</td>
<td></td>
<td>*NB: this is the last possible date and time for submission of the assignment with or without extensions</td>
<td></td>
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<tr>
<td>Assignment 2</td>
<td>Online – <strong>BEFORE</strong> 4pm, Friday 15th May</td>
<td>On-time submissions returned 4PM Friday 5th June*</td>
<td>20%</td>
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<tr>
<td>Compulsory</td>
<td></td>
<td>*NB: this is the last possible date and time for submission of the assignment with or without extensions</td>
<td></td>
</tr>
<tr>
<td>Mastery Quizzes</td>
<td>Online - Every second week (total of 7 – best 5 will count)</td>
<td>Immediately. Unlimited attempts available</td>
<td>10%</td>
</tr>
<tr>
<td>Tutorial Participation</td>
<td>Weekly – you must attend your allocated tutorial</td>
<td>Tutorial attendance records will be made available the week following a tutorial via Blackboard. You will be informed by e-mail that the attendance records for the previous week have been posted. You then have two weeks in which to request a correction if there has been a mistake. Final participation Marks are released to students at the end of Semester via Blackboard Grade Centre. (You must attend at least 80% of tutorials to obtain any part of this 5%, else you will receive 0 for this part of the assessment)</td>
<td>5%</td>
</tr>
<tr>
<td>Exam</td>
<td>During exam period (15th June – 26th June)</td>
<td>University Final Results Release Date for Semester 1, 2015</td>
<td>50%</td>
</tr>
<tr>
<td>Compulsory</td>
<td></td>
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</tbody>
</table>

**Total** 100%

* Completion of compulsory assessments is necessary to pass this unit. Students who fail to complete any of these components will receive an Absent Fail grade, regardless of their marks in other assessments.

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