ATHK1001 Analytical Thinking

Unit of Study Code: ATHK1001

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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

Time Commitment: 4 hours face to face per week; 8 hours private study per week (including up to 1 hour preparation for each tutorial)

Lecture attendance: Required. 80% recommended to pass unit. Audio recordings made of most lecture content and most slides posted online, but technical issues can sometimes prevent material from being recorded.

Tutorial attendance: Required. 80% is order to receive a tutorial participation mark (see ASSESSMENT section). You must attend your scheduled tutorial.

Prerequisites: None

Readings: There is no required textbook. There is a recommended book for the “Data Concepts” section of the course:
Other reading resources may be announced during the semester.

LMS access: You are required to be given access to the LMS site for this Unit of Study from the beginning of the week before semester begins. This document, and in particular details about assessment due dates, weightings and closing dates, must be available on that eLearning site from that time, and changes will not be made to these details throughout semester except in exceptional circumstances. The LMS/elearning portal is: http://elearning.sydney.edu.au

NB: This unit is administered by the School of Psychology within the Faculty of Science.
Note that all due dates and closing dates are 11:59pm on the day listed.

**ASSESSMENT**

*Only count your five best quiz marks out of the seven quizzes towards final mark.*

**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. To fulfill this requirement a serious attempt must be made. A non-serious attempt would be one that is excessively short, or does not address the questions asked, or was not wholly written by the student.*

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### ATHK1001 Assessment Summary

<table>
<thead>
<tr>
<th>Assessment name</th>
<th>Assessment category</th>
<th>Assessment type</th>
<th>Due date</th>
<th>Closing date</th>
<th>Feedback</th>
<th>Assessment weighting</th>
<th>Compulsory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1</td>
<td>Written submitted work</td>
<td>Assignment</td>
<td>Thursday 13th April</td>
<td>Thursday 11th May</td>
<td>Closing date if on time</td>
<td>15%</td>
<td>Yes**</td>
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<tr>
<td>Assignment 2</td>
<td>Written submitted work</td>
<td>Assignment</td>
<td>Monday 22nd May</td>
<td>Tuesday 13th June</td>
<td>Closing date if on time</td>
<td>20%</td>
<td>Yes**</td>
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<tr>
<td>Mastery Quiz #1</td>
<td>Mastery Quizzes</td>
<td>Small test</td>
<td>Friday 10/3</td>
<td>Same as due date</td>
<td>Immediate</td>
<td>2%*</td>
<td>No</td>
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<tr>
<td>Mastery Quiz #2</td>
<td>Mastery Quizzes</td>
<td>Small test</td>
<td>Friday 14/3</td>
<td>Same as due date</td>
<td>Immediate</td>
<td>2%*</td>
<td>No</td>
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<tr>
<td>Mastery Quiz #3</td>
<td>Mastery Quizzes</td>
<td>Small test</td>
<td>Friday 7/4</td>
<td>Same as due date</td>
<td>Immediate</td>
<td>2%*</td>
<td>No</td>
</tr>
<tr>
<td>Mastery Quiz #4</td>
<td>Mastery Quizzes</td>
<td>Small test</td>
<td>Friday 28/4</td>
<td>Same as due date</td>
<td>Immediate</td>
<td>2%*</td>
<td>No</td>
</tr>
<tr>
<td>Mastery Quiz #5</td>
<td>Mastery Quizzes</td>
<td>Small test</td>
<td>Friday 12/5</td>
<td>Same as due date</td>
<td>Immediate</td>
<td>2%*</td>
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</tr>
<tr>
<td>Mastery Quiz #6</td>
<td>Mastery Quizzes</td>
<td>Small test</td>
<td>Friday 26/5</td>
<td>Same as due date</td>
<td>Immediate</td>
<td>2%*</td>
<td>No</td>
</tr>
<tr>
<td>Mastery Quiz #7</td>
<td>Mastery Quizzes</td>
<td>Small test</td>
<td>Friday 9/6</td>
<td>Same as due date</td>
<td>Immediate</td>
<td>2%*</td>
<td>No</td>
</tr>
<tr>
<td>Tutorial Participation</td>
<td>Tutorials</td>
<td>Attendance</td>
<td>Weekly</td>
<td>N/A</td>
<td>Check online</td>
<td>5%</td>
<td>No</td>
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<tr>
<td>Exam</td>
<td>Exam</td>
<td>Final Exam</td>
<td>During exam period</td>
<td>N/A</td>
<td>University Final Results Release Date</td>
<td>50%</td>
<td>Yes**</td>
</tr>
</tbody>
</table>

**Total 100%**

*Notes:*
- **O**nly count your five best quiz marks out of the seven quizzes towards final mark.
- **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. To fulfill this requirement a serious attempt must be made. A non-serious attempt would be one that is excessively short, or does not address the questions asked, or was not wholly written by the student.*
Assignment 1
Contribution to final mark: 15% of your total mark
Length: Up to 750 word
Due Date: Week 6, Thursday 13th April
Closing Date: Thursday 11th May. On-time submissions will be returned this day so late assignments can be accepted up to this date (with a lateness penalty unless). Once the assignment has been returned no late assignments can be accepted.

Assignment 2
Contribution to final mark: 20% of your total mark
Length: Up to 1000 word
Due Date: Week 11, Monday 22nd May
Closing Date: Tuesday 13th June. On-time submissions will be returned this day so late assignments can be accepted up to this date (with a lateness penalty unless). Once the assignment has been returned no late assignments can be accepted.

Mastery Quizzes (1 through 7)
Contribution to final mark: 10% of your total mark. There are a total of seven quizzes each potentially worth 2% of your final mark, so we count your five best quiz marks.
Due Date: Friday every two weeks an on-line mastery quiz is due. Up until it is due it can be done as often as you like. So you can do it until you have all the answers correct. The primary goal of these quizzes is to encourage you to engage continuously with the course material. Note that special consideration is not given for quizzes because you can miss up to two with no effect on your mark.

Tutorial participation
Contribution to final mark: 5% of your total mark
Due Date: YOU MUST ATTEND THE TUTORIAL YOU ARE ENROLLED IN TO BE MARKED AS PRESENT.
Attendance records will be posted to the ATHK1001 LMS pages in the week following the tutorial. If you think a mistake has been made you have two weeks from the posting date to have it revolved.
You must attend 80% or more of your tutorial classes to obtain any part of this 5%. If you fail to attend at least 80% you will receive 0 marks for this part of the assessment.

Final Examination
Contribution to final mark: 50% of your total mark
Due Date: During the Semester 1 exam period (19th June – 1st July). The timetable for all exams exact date is determined by the university and announced during the semester, so you must make sure you are available for the entire exam period.
Format: Multiple choice questions for Data Concepts and Analysis (45% weighting), Logic and Critical Reasoning (30% weighting), and Thinking Tools (25% weighting) sections. If a replacement exam is required it may vary in format to the original exam.

Tutorial attendance
Tutorial attendance records will be made available the week following a tutorial via the LMS. 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%, or else you will receive 0 for this part of the assessment)

Disruptions to your study
If your assessments are disrupted by illness or misadventure or unavoidable community commitments, apply for Special Consideration or Special Arrangements online here: http://sydney.edu.au/current_students/special_consideration/index.shtml
If you have (or develop) a continuing issue, register with Disability Services here: www.sydney.edu.au/disability
In this unit of study Simple Extensions are not granted. Apply formally for special consideration using
the link above if you require any extension.

Note that students who apply for and are granted either special arrangements or special consideration
for examinations in units offered by the Faculty of Science will be expected to sit any replacement
assessments in the two weeks immediately following the end of the formal examination period. Later
dates for replacement assessments may be considered where the application is supported by
appropriate documentation and provided that adequate resources are available to accommodate any
later date.

**Assessment standards and criteria**

Assignments 1 and 2 are compulsory assessments and must be:
- On the correct topic, and in the correct format
- Written wholly by you for this assignment

Otherwise it will not be considered a serious attempt. Because this is a compulsory assessment
requirement, if you do not submit a serious attempt for either assignment you will receive an AF
(Absent Fail) for ATHK1001. Guidelines for writing the assignments will be posted on the LMS site at
an appropriate time.

In ATHK1001 there is no minimum mark for any assessment that automatically results in a fail. If your
final marks across all assessment tasks add up to 50 or more, you will pass the unit.

**Special Consideration**

For the assignments a successful Special Consideration application will result in a reduction in late penalties
only. If you are so badly affected that you are unable to submit an assignment before the closing date (four
or three weeks after the due date) then you may consider using your documentation to apply for
discontinue not fail (DC) from ATHK1001 from the Faculty of Science.

**Replacement Assessment**

After the closing date, if you still have not completed and submitted an assignment, you must complete an
alternate assignment. The alternate assignment will be due on **Monday 3rd July**. Marks are usually not
awarded for the alternate assignment, it is intended for students who submit an attempt which is not
considered serious (e.g. wrong topic, too short, missing sections, plagiarised), or who forget to submit
anything. This is a compulsory assessment, which is why a serious attempt is required to be eligible to
receive any mark other than an AF (Absent Fail).

**Late penalties for Assignments**

You will receive a penalty of 2% of the maximum value of the Assignments 1 and 2 (e.g. 2 marks / 100) for
each calendar day (or part thereof) it is late, up to the closing date of the assignment, after which no more
submissions of the original assignment will be accepted.

**Academic Honesty**

While the University is aware that the vast majority of students and staff act ethically and honestly, it is
opposed to and will not tolerate academic dishonesty or plagiarism and will treat all allegations of
dishonesty seriously.

All students are expected to be familiar and act in compliance with the relevant University policies,
procedures and codes, which include:
- Academic Honesty in Coursework Policy 2015
- Academic Honesty Procedures 2016
- Code of Conduct for Students
- Research Code of Conduct 2013 (for honours and postgraduate dissertation units)
They can be accessed via the University’s Policy Register: [http://sydney.edu.au/policies](http://sydney.edu.au/policies) (enter “Academic Honesty” in the search field).

Students should never use document-sharing sites and should be extremely wary of using online “tutor” services. Further information on academic honesty and the resources available to all students can be found on the Academic Integrity page of the University website: [http://sydney.edu.au/elearning/student/EI/index.shtml](http://sydney.edu.au/elearning/student/EI/index.shtml)

**Academic Dishonesty and Plagiarism**

**Academic dishonesty involves seeking unfair academic advantage or helping another student to do so.**

You may be found to have engaged in academic dishonesty if you:

- Resubmit (or “recycle”) work that you have already submitted for assessment in the same unit or in a different unit or previous attempt;
- Use assignment answers hosted on the internet, including those uploaded to document sharing websites by other students.
- Have someone else complete part or all of an assignment for you, or do this for another student.
- Except for legitimate group work purposes, providing assignment questions and answers to other students directly or through social media platforms or document (“notes”) sharing websites, including essays and written reports.
- Engage in examination misconduct, including using cheat notes or unapproved electronic devices (e.g., smartphones), copying from other students, discussing an exam with another person while it is in progress, or removing confidential examination papers from the examination venue.
- Engage in dishonest plagiarism.

**Plagiarism means presenting another person’s work as if it is your own without properly or adequately referencing the original source of the work.**

Plagiarism is using someone else’s ideas, words, formulas, methods, evidence, programming code, images, artworks, or musical creations without proper acknowledgement. If you use someone’s actual words you must use quotation marks as well as an appropriate reference. If you use someone’s ideas, formulas, methods, evidence, tables or images you must use a reference. You must not present someone’s artistic work, musical creation, programming code or any other form of intellectual property as your own. If referring to any of these, you must always present them as the work of their creator and reference in an appropriate way.

Plagiarism is always unacceptable, regardless of whether it is done intentionally or not. It is considered dishonest if done knowingly, with intent to deceive or if a reasonable person can see that the assignment contains more work copied from other sources than the student’s original work. The University understands that not all plagiarism is dishonest and provides students with opportunities to improve their academic writing, including their understanding of scholarly citation and referencing practices.

**Use of similarity detection software**

All written assignments submitted in this unit of study will be submitted to the similarity detecting software program known as Turnitin. Turnitin searches for matches between text in your written assessment task and text sourced from the Internet, published works and assignments that have previously been submitted to Turnitin for analysis.

There will always be some degree of text-matching when using Turnitin. Text-matching may occur in use of direct quotations, technical terms and phrases, or the listing of bibliographic material. This does not mean you will automatically be accused of academic dishonesty or plagiarism, although Turnitin reports may be used as evidence in academic dishonesty and plagiarism decision-making processes.
LEARNING OUTCOMES

ATHK1001 provides a general introduction to analytic thinking and how it can be applied to any area of study. ATHK1001 has three broad content areas: data concepts and analysis, logic and critical reasoning, and thinking tools.

Depth of disciplinary expertise

By the end of the analytic thinking unit you will have a basic conceptual understanding of statistics, though not of its mathematical underpinnings. You will have a basic understanding of how logic can help you think critically, and of the ways people may think more effectively when having to reason, make decisions or learn. These skills should help you in a wide range of courses and could be deepened by taking further units in these areas.

Broader skills

Graduates of the University will be able to identify and analyse problems, and be both creative and principled thinkers within their discipline. Analytical Thinking will contribute to this by helping you:
(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 ways of approaching the exploration of a research question.
(v) Identify errors in thinking and how to avoid them.

Graduates of the University will be able to use information effectively in a range of contexts. Analytical Thinking will contribute to this by helping you:
(i) Demonstrate an understanding of different types of research 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 the implications of this

Cultural Competence

In ATHK1001 you will interact with students from many backgrounds and cultural groups, so you are sure to meet and be challenged by a diverse array of personalities and perspectives. Examples used to illustrate analytic thinking will come from a variety of disciplines and cultures.

Interdisciplinary effectiveness

Analytic thinking is not specific to a particular discipline it tools are designed to be cross-disciplinary. Although the background of the teaching staff is psychology, we strive choose examples of how these tools apply in many domains.

An integrated professional, ethical and personal identity

Graduates of the University will be able to work independently and sustain an attitude of openness and capacity to meet new challenges. Analytical Thinking will contribute to this by helping you:
(i) Demonstrate an active participation in debate and discussion.
(ii) Demonstrate the ability to work independently.
(iii) Show a willingness to engage 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 empirical questions.
Graduates of the University will hold personal values and beliefs consistent with their role as responsible members of local, national, international and professional communities. Analytical Thinking will contribute to this by helping you:
(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.

Influence

An understanding of analytic thinking will help you make a more effective at exercising your professional skills. By helping you evaluate the claims and data that people use you can better contribute to society.

SYLLABUS

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.

Data Concepts and Analysis

Conveying information through data
Introduction to ways of describing data such as descriptive statistics, correlation and distributions. Understanding the assumptions and limitations of such descriptions and how to ask the right questions about data so as to be able to assess its usefulness.

Answering questions with data
How we use data to answer questions. Based on an understanding of probability we build up the conceptual basis of hypothesis testing and statistical inference (including t-tests and basic regression analysis). The emphasis is on understanding the results of such analysis rather than the calculations required. From such a conceptual understanding you should be able to critique the use and misuse of these analyses based on aspects such as their research design or data collection methods.

Logic and Critical Reasoning

Elements of argument
Introduction to the structure of arguments and explanations. The role of meaning and definition in argument.

Non-Deductive Argument
Induction and inductive scepticism. Distinguishing causation from correlation.

Case Studies
Science, non-science and pseudo-science. Fallacies in political debates.

Thinking Tools

Reasoning, decision making and problem solving
Introduction to what research into thinking tells us about errors people make, and thus how we may better reason and make decisions.

Effective learning
Applying what we know about memory and skill acquisition to formulate principles for how people learn most effectively.
## LECTURE/TUTORIAL TIMETABLE

<table>
<thead>
<tr>
<th>WEEK (begin)</th>
<th>LECTURES (plus readings)</th>
<th>TUTORIALS</th>
<th>Due dates</th>
</tr>
</thead>
</table>
| 1 (6/3)     | 1. What is analytic thinking?  
2. Why study statistics? (Wheelan, Ch. 1)  
3. Descriptive statistics (Wheelan, Ch. 2) | Tutorial 1: Orientation | Quiz 1 due by 12/3 |
| 2 (13/3)    | 4. Deceptive statistics (Wheelan, Ch. 3)  
5. Correlation (Wheelan, Ch. 4)  
6. Basic probability (Wheelan, Ch. 5) | Tutorial 2: Using descriptive statistics | |
| 3 (20/3)    | 7. Problems with probability (Wheelan, Ch. 6)  
8. Collecting data (Wheelan, Ch. 7)  
9. More data | Tutorial 4: Instructions for Assignment 1 | Quiz 2 due by 26/3 |
| 4 (27/3)    | 10. The central limit theorem (Wheelan, Ch. 8)  
11. Using the central limit theorem  
12. Inference (Wheelan, Ch. 9) | Tutorial 3: Using correlation | |
| 5 (3/4)     | 13. Polling (Wheelan, Ch. 10)  
14. Regression (Wheelan, Ch. 11)  
15. Regression analysis issues (Wheelan, Ch. 12) | Tutorial 5: Underpinnings of hypothesis testing | Quiz 3 due by 7/4 |
| 6 (10/4)    | 16. Categorical data  
17. Program evaluation (Wheelan, Ch. 13)  
18. Summing up | Tutorial 6: Testing hypotheses | Assignment 1 due 13/4 |
| (17/4)      | **NON-TEACHING WEEK** | | |
| 7 (24/4)*   | ANZAC Day (No Tuesday lecture this week)  
19. Use and misuse of correlations/P-hacking  
20. Preregistration | Tutorial 7: Using statistical tests | Quiz 4 due 28/4 |
| 8 (1/5)     | 21. Who to believe? Authorities  
22. Authorities and Survivorship bias  
23. My-side bias | Tutorial 8: Correlation issues | |
| 9 (8/5)     | 24. Good arguments  
25. Good arguments  
26. Arguments in politics | Tutorial 9: Arguments and Fallacies | Quiz 5 due 12/5 |
| 10 (15/5)   | 27. Spin and spreading ignorance  
28. Spin and spreading ignorance  
| 11 (22/5)   | 30. *Introduction to Thinking Skills*  
31. Reasoning errors  
32. Better reasoning | Tutorial 11: Reasoning | Assignment 2 due 22/5  
Quiz 6 due 26/5 |
| 12 (29/5)   | 33. Heuristics and biases  
34. Decision making 1  
35. Decision making 2 | Tutorial 12: Decision making | |
| 13 (5/6)    | 36. Improving thinking and learning 1  
37. Improving thinking and learning 2  
38. Wrapping up | Tutorial 13: Applications | Quiz 7 due 9/6 |

Note that lecture and tutorial 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.

*Anzac Day Public Holiday is Tuesday of Week 7. Lectures and tutorials are not held on Public Holidays. If you are in an affected tutorial please go to another tutorial session during the week. Ask the tutor before the tutorial if you can sit in.

### Data collection

Note that your participation in this unit of study permits us to use your learning analytics to improve your experience of learning.