Assessment 3: Scientific Argument

Weighting: **25% of final grade for the course**
Word count: **1000 words**

Your task is to present a scientific argument regarding an issue, where one's stance is enhanced by an informed understanding of science. You must construct and justify a stance on a chosen issue for which there is scientific evidence available. The argument must be researched and developed individually, although you may consult your peers or those outside the course (friends and family) for feedback on your argument ideas, defence and communication. The word count of this assignment is expected to be between 900 and 1100 words, with no more than 1150 words assessed. References are excluded from the word count. A minimum of six references is expected from students expecting to receive a grade of 4. The use of highly credible sources, i.e. journal articles, is required for a grade of 6 or 7.

Opportunities to learn more and practice scientific argumentation are presented in seminars and online.

**Your penultimate draft is due for submission to Turnitin by 7 pm on Wednesday 6 September.** This draft will then be anonymously reviewed by two peers who will provide feedback to help you improve your argument. This constructive feedback will help you to identify gaps in your argument, ambiguous statements, evidence that lacks credibility, or explanations that may be based on superficial or faulty understanding of scientific ideas. Feedback might also provide you with counterarguments that you should rebut in your revision. You will also be responsible for anonymously reviewing two papers that your peers have submitted. Giving constructive feedback is an important skill for teaching – if not THE most important skill for teaching – and this is a good opportunity to practice being a teacher. Feedback should be relevant, accurate, and insightful. Help each other out! Feedback must be submitted by 7 pm on Wednesday 13 September.

**Your final version of your argument should be submitted to Turnitin by 7 pm on Wednesday 20 September.**

**Definitions**

*Analysis*: detailed consideration of meaning and relationships, identification of patterns, similarities and differences.

*Backing*: the link between data and warrants, including explanations, theoretical assumptions, and scientific reasoning.

*Basic*: essential or elementary.

*Claim*: the main position, stance on an issue; the central thesis of an argument.

*Cogent*: appealing to reason (not emotion).

*Coherent*: orderly, logical, internally consistent relationship between elements. Rational.

*Comprehensive*: detailed and thorough, including all that is relevant without that which is irrelevant.
Concise: brief and to the point, succinct without losing clarity or logic of the argument.
Consistent: agreeing or accordant, compatible; not self-opposed or self-contradictory; constantly adhering to the same principles.
Counterargument: warrants that directly oppose those stated in support of a claim.
Credible: worthy of being believed
Criteria: the principles by which something may be judged or decided
Critical: rationally appraising for logical consistency and merit
Data: evidence, facts, information; evidence should be sufficient, credible, and accurate.
Deductive: arrived at by reasoning.
Detailed: executed with attention to detail.
Developed: constructed, elaborated or expanded.
Effective: meeting the assigned purpose
Evaluation: detailed examination and substantiated judgment concerning the merit, significance or value of something.
Evidence: see data.
Explicit: distinctly expressing all that is meant, leaving nothing implied or merely suggested.
Insightful: understanding of relationships in complex scenarios; informed by observation and deduction.
Justified: sound reasons or evidence to support a statement have been provided; soundness requires that the reasoning is logical and the premises are likely to be true.
Logical: rational and valid; internally consistent.
Minimal: small, the least amount, negligible.
Qualification: conditions of exception; moderation of an idea within defined conditions.
Reasoning: see backing.
Rebuttal: a warrant provided to address a counterargument.
Relevant: applicable and pertinent, has direct bearing on.
Reliable: constant and dependable, consistent, repeatable.
Routine: often encountered, previously experienced; commonplace; well-practiced; regular.
Simplistic: characterised by extreme simplification or reduction of value, especially if misleading.
Standard: level of quality or attainment.
Superficial: apparent, obvious or trivial.
Synthesis: combination of elements (components, information, ideas) into a coherent whole.
Thorough: carried through or applied to the whole of something.
Vague: couched in general or nonspecific terms; not definitely or precisely expressed; deficient in details or particulars.
Valid: able to be supported, legitimate, scientifically defensible, applicable.
Warrant: reasons, assumptions, beliefs, values, principles, premises; link between the claim and the evidence; ideally warrants are explicitly stated.
**Professional Standards for Teachers**

Students who successfully complete this assessment will demonstrate the following Australian Professional Standards for Teachers:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
<th>Demonstration in this assessment piece</th>
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<tbody>
<tr>
<td>2.1</td>
<td>Content and teaching strategies of the teaching area</td>
<td>Development of knowledge and understanding of the concepts, processes and epistemologies relating to science to a scientific argument</td>
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<tr>
<td>5.2</td>
<td>Provide feedback to students on their learning</td>
<td>Provision of timely and appropriate feedback to other students regarding their learning, including scientific understanding, skills of argumentation, critical thinking about science and written work.</td>
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<tr>
<td>6.3</td>
<td>Engage with colleagues and improve practice</td>
<td>Seeking and applying feedback from peers for the improvement of practice in the field of scientific inquiry.</td>
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Grading

An argument worthy of a *fail*, receiving a **grade of 1**, fails to demonstrate most or all of the basic requirements of a scientific argument.

An argument worthy of a *fail*, receiving a **grade of 2**, demonstrates clear deficiencies in understanding and applying fundamental scientific concepts and ideas. Communication of ideas is incomplete or confusing. Little attention has been given to the conventions of scientific argument.

An argument worthy of a *fail*, receiving a **grade of 3**, is an argument demonstrating little understanding of the value of scientific evidence and explanation. Evidence is non-scientific and explanations demonstrate superficial, partial or faulty understanding of the fundamental concepts and ideas of science. These ideas are applied to the development of an inappropriate or unscientific argument. Communication lacks clarity or is incoherent or ambiguous.

An argument worthy of a *pass*, receiving a **grade of 4**, is a routine argument justified by acceptable evidence and explanation. Evidence is largely credible. Supporting explanations demonstrate adequate understanding of fundamental scientific concepts and ideas. Communication is coherent.

An argument worthy of a *credit*, receiving a **grade of 5**, is a reasoned argument presenting relevant evidence and explanation, including an attempt to rebut counterargument or opposing views. This argument is supported by credible evidence presented by primary and secondary sources of scientific research. Supporting explanations demonstrate knowledge of fundamental scientific concepts and ideas. A rebuttal to the claims of opposing viewpoints is presented. The author has developed or adapted a convincing argument with coherent justification.

An argument worthy of a *distinction*, receiving a **grade of 6**, is a reasoned argument presenting relevant evidence and logical explanation, including an attempt to rebut counterargument. This argument is supported by credible evidence provided by primary and secondary sources of scientific research. Supporting explanations demonstrate a good knowledge of scientific concepts and ideas. A rebuttal to the claims of opposing viewpoints is rational and largely free from fallacy or bias. The argument is communicated clearly and coherently. There is frequent evidence of the author’s insight in analysing the issue.

An argument worthy of a *high distinction*, receiving a **grade of 7**, is a reasoned argument presenting relevant evidence and logical explanation, including a valid rebuttal against counterargument. This argument is strengthened by substantial credible evidence provided by scientific research. Supporting explanations demonstrate a deep understanding of all scientific concepts and ideas. A rebuttal to the arguments of opposing viewpoints is rational and free from fallacy or bias. The argument is communicated clearly, concisely, and coherently. There is consistent evidence of the author’s insight in identifying, generating and communicating the argument, including critical evaluation of evidence and thoughtful consideration of the implications of the issue.
<table>
<thead>
<tr>
<th>Assessment 3: Scientific Argument Criteria and Standards</th>
<th>Fail (1)</th>
<th>Fail (2)</th>
<th>Fail (3)</th>
<th>Pass (4)</th>
<th>Credit (5)</th>
<th>Distinction (6)</th>
<th>High Distinction (7)</th>
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<tr>
<td>Consistency</td>
<td>No determination of basic relationships within or between warrants, data and backing.</td>
<td>Simplistic determination of basic relationships within or between warrants, data and backing.</td>
<td>Determination of basic relationships within or between warrants, data and backing.</td>
<td>Determination of relationships within and between warrants, data and backing.</td>
<td>Considered determination of relationships within and between warrants, data and backing.</td>
<td>Informed determination of significant relationships within and between warrants, data and backing.</td>
<td>Insightful determination of significant relationships within and between warrants, data and backing.</td>
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<tr>
<td>Communication</td>
<td>Ambiguous use of language conventions.</td>
<td>Inconsistent use of language conventions suited to purpose or audience.</td>
<td>Use of language conventions suited to aspects of the purpose or audience.</td>
<td>Use of language conventions suited to the purpose and audience.</td>
<td>Appropriate language conventions suited to the purpose and audience; use of some technical terminology.</td>
<td>Appropriate language conventions suited to the purpose and audience; correct use of technical terminology.</td>
<td>Well-chosen language conventions suited to the purpose and audience; effective use of technical terminology.</td>
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