Thesis Title: Subtitle

by

[Candidate Name]

A Thesis
Submitted to the School of [School or Department]
[University Name], Australia
In Fulfilment of the Requirements
for the Degree of Doctor of Philosophy
in Electrical Engineering
[Month Year of Submission]

Methodology Chapter Template for Electrical Engineering PhD Candidates in Australia

TEMPLATE

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Chapter 3: Research Methodology

This chapter 3 template gives you a research methodology format you can fill in section by section. Your methods chapter should explain how you answered your research questions, in enough detail that another engineer could repeat your work. Complete each section below, replace the bracketed text with your own details, then delete the guidance notes. Each section is short on purpose: say what you did, why you did it, and how you know it worked.

3.1 Introduction and Research Questions

- Purpose: State what the chapter covers and link it back to the questions set out in Chapter 1.
- Scope: Mark the boundaries of the chapter and note anything left for later chapters.
- Questions or hypotheses: List each question beside the method that answers it. A short table works well.

3.2 Research Design

- Chosen approach: Name your approach: experiment, simulation or mixed methods.
- Justification: Explain why this approach suits your question better than the alternatives. Examiners look for a justified choice, not just a described one.
- Alternatives considered: Briefly note why you rejected other designs, such as cost, time or the lack of a validated model.
- Workflow: Add a flow diagram showing how the stages connect, from model development through to validation.

Example: Simulation came first because building a full-scale network was not feasible. Results were then validated on a laboratory-scale prototype.

3.3 System Model, Equipment and Setup

- Model: Give the governing equations, assumptions, parameters, and the software and version used.
- Equipment: List instruments, prototypes and calibration details, with model numbers and the laboratory used.
- Safety: Record risk assessments and any safety approvals.

Example: Voltage and current were captured with a four-channel oscilloscope at [X] MHz, calibrated before each test session.

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3.4 Data Collection and Sampling

- Test conditions: Define test cases, operating ranges and the number of repeats.
- Sample size: Justify how many runs, trials or datasets you used, and why that number is enough.
- ***Example:*** *Each operating point was repeated [X] times to estimate variability, and the mean and standard deviation are reported.*
- Data management: Describe storage, backup and version control, in line with your university policy and the Australian Code for the Responsible Conduct of Research.

3.5 Validation and Verification

- Model validation: Compare simulation outputs with measured data or a published benchmark.
- Uncertainty: Report measurement error, tolerances and how you handled noise.
- Reproducibility: Say how a reader can reproduce your results, including code, parameters and datasets.

Example: *Simulated efficiency matched measured values within [X] per cent across the tested load range*

3.6 Data Analysis

- Methods: Describe your statistical tests, curve fitting or performance metrics, and explain why each fits your data.
- Tools: Name the analysis software and versions.
- ***Example:*** *Differences between the two controllers were tested with a paired t-test at the 5 per cent significance level.*
- Acceptance criteria: State in advance what result would count as success or failure.

3.7 Ethics and Research Integrity

Ethics approval: If human participants are involved, record the approval number and refer to the National Statement on Ethical Conduct in Human Research. Pure simulation often needs no approval, so confirm with your university.

Integrity: Note data ownership, authorship and any industry partner agreements.

Example: *This study involved no human participants, so ethics review was not required. [Confirm with your university.]*

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3.8 Timeline and Resources

- Milestones: Link each method stage to your candidature milestones.
- Facilities: Note laboratory bookings, software licences and any industry support you depend on.

3.9 Limitations

- Assumptions and limits: Be upfront about what your method cannot show. Examiners respect honesty here.

Example: Results apply to the tested voltage range and may not extend to higher-power systems.

3.10 Chapter Summary

- Summary: Recap the main choices in a few lines and lead into Chapter 4.

Notes for Usage:

- Adjust the structure: Follow your university's HDR handbook and your supervisor's advice where they differ from this template.
- Tense: Write in the past tense for completed work. For confirmation of candidature, use the future tense.
- Citations: Use one citation style throughout, ideally managed with a reference manager.
- Figures and tables: Place table captions above tables and figure captions below figures, and cross-reference both in the text.
- Next step: Check your draft against the Engineering Methodology Self-Check, the next page in this series.

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