

# Sample Thesis Document

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## INTRODUCTION

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This document demonstrates the thesis document class, designed for longer academic works such as master's theses, doctoral dissertations, and comprehensive research reports. The template provides a structured framework for extensive academic writing.

### Note: Thesis Template Features

The thesis class provides comprehensive support for multi-chapter documents, including proper chapter formatting, cross-referencing, and academic citation standards.

## 1.1 Research Context

Academic research requires careful presentation of complex ideas and mathematical formulations. Our template supports sophisticated typesetting for expressions like:

$$\mathcal{L}(\theta) = \sum_{i=1}^n \log p(x_i|\theta) \quad (1.1)$$

$$\hat{\theta}_{MLE} = \arg \max_{\theta} \mathcal{L}(\theta) \quad (1.2)$$

## 1.2 Methodology

The methodology section demonstrates various formatting capabilities:

### 1.2.1 Experimental Design

1. Hypothesis formulation and theoretical framework
2. Data collection and preprocessing procedures
3. Statistical analysis and validation methods
4. Results interpretation and discussion



## LITERATURE REVIEW

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This chapter would typically contain an extensive review of relevant literature, properly cited and organized thematically.

### 2.1 Theoretical Foundations

Complex mathematical derivations and proofs can be presented clearly:

$$\frac{\partial}{\partial \theta} \mathcal{L}(\theta) = \sum_{i=1}^n \frac{\partial}{\partial \theta} \log p(x_i | \theta) = 0$$

### 2.2 Current Research Trends

Modern research in this field focuses on several key areas, each requiring detailed mathematical treatment and empirical validation.



## METHODOLOGY AND RESULTS

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### 3.1 Data Analysis

Statistical results and their interpretation form a crucial part of thesis work. Our template ensures proper formatting for tables, figures, and mathematical expressions.

### 3.2 Discussion

The discussion section integrates findings with existing literature and theoretical frameworks.





## CONCLUSIONS AND FUTURE WORK

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### 4.1 Summary of Contributions

This thesis has demonstrated several key contributions:

- Novel theoretical framework development
- Empirical validation of proposed methods
- Practical applications and implementations
- Future research directions

### 4.2 Future Directions

Future research should explore extensions of this work to related domains and investigate scalability considerations for larger datasets.





## COLOR PALETTE REFERENCE

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This appendix documents two complementary color systems designed to be **distinct** from each other:

- **Washi-Ink** — 19 colors, warm-dominant + cool extensions, traditional Japanese aesthetic
- **Oceanic** — 21 colors, cool-dominant (H: 180–240°), scientific/technical aesthetic

All 17 chromatic Washi colors have  $\Delta E \geq 18$  to any Oceanic color, ensuring the palettes can be used together without confusion.

### A.1 Washi-Ink (19 Colors)

#### Design Philosophy

*“Warm earth tones on handmade paper”*

手漉き和紙の上の暖かい土色

**Character:** Earthy, organic, traditional Japanese. Warm-dominant hues (H: 0–70°) with signature browns that Oceanic lacks. Saturation 27–85% for rich, warm tones.

#### 1. Reds — 赤系 (Aka)

- **washiAka** (#B03030, H:0° S:57%): 赤 True red
- **washiBeni** (#C04050, H:352° S:50%): 紅 Crimson-pink

#### 2. Oranges — 橙系 (Daidai)

- **washiKaki** (#C06030, H:20° S:60%): 柿 Persimmon
- **washiKitsune** (#A06030, H:26° S:54%): 狐 Fox orange

#### 3. Browns — 茶系 (Cha) — *UNIQUE to Washi*

- **washiTobi** (#8B4513, H:25° S:76%): 鳶 Kite/Saddle brown
- **washiKuri** (#5C4033, H:19° S:29%): 栗 Chestnut
- **washiRikyucha** (#897858, H:39° S:22%): 利休茶 Rikyu tea (Sen no Rikyū)

#### 4. Golds — 金系 (Kin)

- **washiKarashi** (#D0A020, H:44° S:73%): 芥子 Mustard
- **washiKinchā** (#C09010, H:44° S:85%): 金茶 Gold tea
- **washiYamabuki** (#F8B500, H:44° S:100%): 山吹 Kerria yellow (vivid)

#### 5. Yellow-Greens — 萌黄系 (Moegi)

- **washiUguisu** (#807020, H:50° S:60%): 鶯 Warbler
- **washiMoegi** (#A0B040, H:69° S:47%): 萌黄 Sprouting green

#### 6. Pinks — 桃系 (Momo)

- **washiSakura** (#E0B0B0, H:0° S:44%): 桜 Cherry blossom
- **washiBotan** (#C05080, H:338° S:50%): 牡丹 Peony

#### 7. Neutrals

- **washiSumi** (#2A2018, H:27° S:27%): 墨 Warm ink (brown-black)
- **washiShiro** (#F8F0E0, H:40° S:63%): 白 Paper white (cream)

#### 8. Cool Extensions — 填補 H:100–320° gap

*“Warm-feeling” cool colors with traditional usage, filling the hue gap while maintaining  $\Delta E \geq 18$  to Oceanic.*

- **washiKuromidori** (#102808, H:105° S:66%): 黒緑 Black-green (dark pine forest)
- **washiEbizome** (#501858, H:292° S:57%): 葡萄染 Grape dye (textile color)
- **washiShikon** (#460E44, H:302° S:66%): 紫紺 Purple navy (warm-blue)

### A.2 Washi-Ink Visual Swatches

### A.3 Washi-Ink Usage Guidelines

#### Recommended Subsets

- **4 colors** ( $\Delta E \geq 35$ ): Aka, Karashi, Moegi, Sumi
- **6 colors** ( $\Delta E \geq 25$ ): Aka, Kaki, Tobi, Karashi, Moegi, Botan
- **8 colors** (with markers): Aka, Beni, Kaki, Tobi, Karashi, Uguisu, Sakura, Sumi

#### Pairs to Avoid

Low perceptual distinctiveness ( $\Delta E < 20$ )—use secondary encoding:

- Kaki + Kitsune ( $\Delta E = 15$ ) — similar oranges
- Karashi + Kincha ( $\Delta E = 12$ ) — similar golds
- Tobi + Kuri ( $\Delta E = 18$ ) — similar browns (but both dark)



Figure A.1: Washi-Ink (19 colors). Warm-dominant palette with cool extensions filling H:100–320° gap.

**Best For**

Use Case	Suitability
Art/humanities papers	Excellent — traditional aesthetic
Cultural/historical content	Excellent — Japanese authenticity
Presentations/posters	Good — warm, inviting feel
Data charts ( $\leq 6$ series)	Good with markers
Scientific papers	Use Oceanic instead

A.4 Oceanic Palette — Morandi → Saturated → Crystal

The **Oceanic** palette provides 21 base colors × 3 tiers = 63 total colors. Nomenclature: oceanicColor1/2/3.

**Tier 1 (Morandi)** Muted base tones, low chroma — for lines, text, subtle accents

**Tier 2 (Saturated)** Same lightness, higher chroma (C×1.6) — emphasis, active states

**Tier 3 (Crystal)** Higher lightness (L+0.20), high chroma (C×1.4) — backgrounds, fills

“Quiet → Vivid → Light+Vivid” — T2 is most saturated; T3 trades some chroma for lightness.

Three-Tier Comparison

	Tier 1 Morandi	Tier 2 Saturated	Tier 3 Crystal		Tier 1	Tier 2	Tier 3
Abyss	1	2	3	Citrus	1	2	3
Current	1	2	3	Amber	1	2	3
Mist	1	2	3	Coral	1	2	3
Cyan	1	2	3	Rose	1	2	3
Teal	1	2	3	Crimson	1	2	3
Sage	1	2	3	Magenta	1	2	3
Moss	1	2	3	Plum	1	2	3
Olive	1	2	3	Violet	1	2	3

Figure A.2: Oceanic chromatic colors (16 × 3 = 48). Left: Blues (3) + Greens (5). Right: Warm (5) + Pinks/Purples (3).

	Tier 1	Tier 2	Tier 3
Cloud	1	2	3
Sand	1	2	3
Foam	1	2	3
Slate	1	2	3
Ink	1	2	3

Figure A.3: Oceanic neutrals (5 × 3 = 15). Cloud/Sand provide graduated backgrounds; Foam/Slate/Ink for structure.

Recommended Subsets

- **5 colors** ( $\Delta E \geq 40.6$ ): Current, Sage, Coral, Foam, Ink
- **6 colors** ( $\Delta E \geq 38.9$ ): Current, Sage, Amber, Foam, Ink, Rose
- **8 colors** ( $\Delta E \approx 25$ ): Current, Moss, Sage, Coral, Crimson, Foam, Ink, Violet

Palette Comparison

Aspect	Washi-Ink	Oceanic
Aesthetic	Japanese traditional	Scientific-maritime
Dominant hues	Warm (H: 0–70°) + cool ext.	Cool (H: 180–240°)
Total colors	19	63 (21 base × 3 tiers)
Tier system	—	Morandi / Saturated / Crystal
Color space	HSL	OKLCH (perceptually uniform)
Tier philosophy	—	T2: same L, more C; T3: more L+C
Signature feature	Browns + Purples	Blues (Abyss, Current, Mist)
Cross-palette $\Delta E$	$\geq 18$ for all chromatic	$\geq 18$ for all chromatic
Best for	Art, culture, presentations	Science, data, dashboards

A.5 Pairs to Avoid (Both Palettes)

Colors with  $\Delta E < 20$  may be confused, especially in small sizes or by viewers with color vision deficiency. Use secondary encoding (patterns, markers, labels) when these pairs must appear together.

Washi-Ink — Pairs to Watch ( $\Delta E < 20$ )



Figure A.4: Washi-Ink closest pairs. Original 16 warm colors shown; cool extensions add 3 more.

*Note: The core Washi palette (16 warm colors) is compact with good internal distinctiveness. The 3 cool extensions fill hue gaps while maintaining  $\Delta E \geq 18$  to Oceanic.*

Oceanic — High-Risk Pairs ( $\Delta E < 15$ )

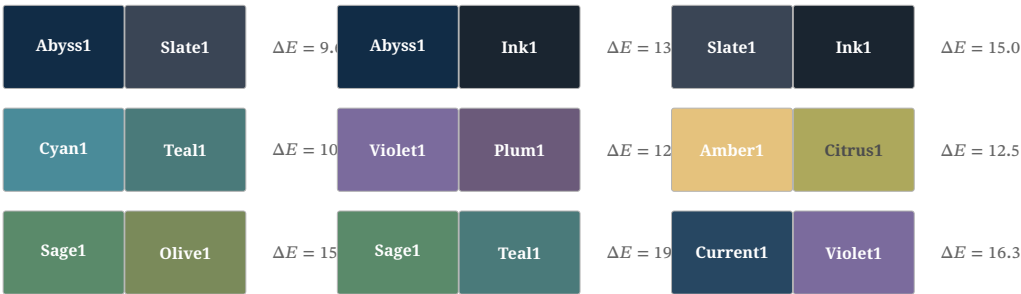
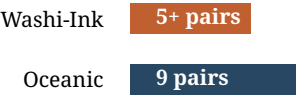


Figure A.5: Oceanic worst pairs. Dark neutrals (Abyss/Slate/Ink) and extension-base pairs are closest.

Summary



*Washi-Ink (19 colors) and Oceanic (63 colors across 3 tiers) provide complementary aesthetics. All cross-palette  $\Delta E \geq 18$  for chromatic colors.*