NJIT Format and Style for Theses and Dissertations

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Associate Provost for Graduate Studies

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Office of Graduate Studies (GSO)
PURPOSE OF DOCUMENT
STANDARDIZATION

- To facilitate uniformity of NJIT thesis and dissertation documents via standard formatting.
- To develop consistency in written presentations and research.
- To expedite thesis and dissertation authoring.
- Approved format given in “Guidelines for Writing Thesis and Dissertations” *Herman A. Estrin and Timothy E. Roche* (2nd edition; out of print; can be found in the NJIT library).
THESIS AND DISSERTATION TEMPLATES
PROPER ORDER AND NUMBERING OF PAGES

- Abstract (no page number; counted as separate document; 1 page for a Master's Thesis; 2 pages maximum for a Doctoral Dissertation).
- Title Page (no page number but counted as page i).
- Copyright Page for Dissertation (no page number but counted as page ii; insert blank page for Thesis).
- Approval Page (no page number but counted as page iii).
- Biographical Sketch (counted as page iv and first page numbered on bottom).
PROPER ORDER AND NUMBERING OF PAGES

- Dedication Page (page number is shown).
- Acknowledgment Page (page number is shown).
- Table of Contents (page numbers are shown).
- List of Tables (if needed; page numbers are shown).
- List of Figures (if needed; page numbers are shown).
- List of Symbols and/or Abbreviations (if needed; page numbers are shown).
- Text (page numbers are shown, begins with page 1).
- Appendices (page numbers are shown).
- References (page numbers are shown).
GENERAL FORMATTING

- Spell check after all changes.
- Check grammar and syntax. Help is available; ask.
- Use consistent capitalization in Titles, Headings, Figures and Tables.
- Be consistent in the title of the document on Abstract/Title Page/Approval Page.
- Check correct order of sections and page numbers in Text with Table of Contents.
- Use correct font style and size – be consistent

Caution: Software spell checking may not distinguish between CAPITAL and small letters.
ABSTRACT

- Include brief problem statement, description of methods, summary of most important results and conclusions.
  - Write Conclusions section before you write Abstract.
  - Include a clear list of motivations for your research followed by a list of relevant objectives to be accomplished.
  - Minimize background information.
- Describe and emphasize what was actually done in the research in the third person and present tense.
- Use identical format and font size (use Arial or Times New Roman 12 pt.) of titles on Abstract page, Title page, Approval page and throughout document.
ABSTRACT

ADAPTIVE SPACE-TIME PROCESSING FOR WIRELESS COMMUNICATIONS

by

Xiao Cheng Bernstein

Adaptive space-time processing techniques have been considered in the past to increase the capacity of two major, multiple-access wireless communication systems: Time Division Multiple Access (TDMA) and Code Division Multiple Access (CDMA). Space processing uses multiple antennas which, in turn, provide alternative signal paths in order to cancel interferences and combat multipath fading. In this investigation, the eigencanceler method was used to evaluate theoretical optimum combinations. The feasible direct matrix inverse (DMI) technique was also evaluated. An analysis of the system performance revealed that when data sets are small, the eigencanceler technique is superior to the DMI technique. A simple projection-based algorithm was proposed and its performance analyzed.
system performance revealed that when data sets are small, the eigencanceler technique is superior to the DMI technique. A simple projection-based algorithm was proposed and its performance analyzed.

The capacity of CDMA communication systems is normally restricted by multiple-access interferences (MAI). It was shown that spatial and temporal processing can be combined to increase the capacity of CDMA-based wireless communications systems. The degrees of freedom provided by space-time processing were exploited to combat both fading and MAI. Specifically, the following methods were considered: (1) space-time diversity, (2) cascade optimum spatial-diversity temporal, (3) cascade optimum spatial-optimum temporal, and (4) joint-domain optimum processing. It was proved that, due to its interference cancellation capability, optimum combining provides significantly better performance than diversity techniques.
TITLE PAGE

- View format of Title pages for various disciplines
- Follow samples provided precisely.
- Identify correct month (August, January, or May) and year of graduation.
- Provide correct degree title.
- Check correct department/program title.
ADAPTIVE SPACE-TIME PROCESSING
FOR WIRELESS COMMUNICATIONS

by
Xiao Cheng Bernstein

A Dissertation
Submitted to the Faculty of
New Jersey Institute of Technology
in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy in Electrical Engineering
Department of Electrical and Computer Engineering

January 1996

You have 17 or 18 single spaces here depending on the length of your title.
Make sure your name appears in the middle of the page.
You have 14 single spaces here
Make sure you list the right title and department here. A list of the title page samples is available at
http://www.njit.edu/graduatesudies/Title.php

Use two single spaces and then enter the date of graduation (either January, May or August + Year)
Three MS Thesis Committee members (minimum) needed for thesis approvals including thesis advisor.

Chair of the Committee, (usually the thesis advisor), must be a faculty member holding a tenure-track position.

Five PhD Committee members (minimum) needed for dissertation approvals, including the dissertation advisor.

Check composition of committee with the Office of Graduate Studies. Submit the signed Committee Appointment Report to GSO for approval as early as possible.

Use correct spelling of names and proper academic titles of faculty members. (Check with your department administrative assistant for correct spelling of names, faculty ranks and titles. Remember websites are not always up to date.)
Adaptive Space-Time Processing for Wireless Communications

Xiao Cheng Bernstein

Dr. Alexander M. Haimovich, Dissertation Advisor
Associate Professor of Electrical and Computer Engineering, NJIT

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Dr. Michael Porter, Committee Member
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Dr. Zoran Siveski, Committee Member
Assistant Professor of Electrical and Computer Engineering, NJIT

Dr. Jack H. Winters, Committee Member
Member of Technical Staff, AT&T Bell Laboratories, Holmdel, NJ
BIOGRAPHICAL SKETCH

- Provide correct title and date of current degree.
- Use correct spacing and number of tabs.
- Include month and year of degree (not defense).
- Enter “New Jersey Institute of Technology” and any other institutional name on a single line.
- Include all prior degrees, in chronological order, but begin with the NJIT degree you will receive.
BIOGRAPHICAL SKETCH

Author: Xiao Cheng Bernstein

Degree: Doctor of Philosophy

Date: January 1996

Date of Birth: November 3, 1965

Place of Birth: Shanghai, P. R. China

Undergraduate and Graduate Education:

- Doctor of Philosophy in Electrical Engineering, New Jersey Institute of Technology, Newark, NJ, 1996

- Master of Science in Electrical Engineering, Shanghai Jiao Tong University, Shanghai, P. R. China, 1991

- Bachelor of Science in Electrical Engineering, Shanghai Jiao Tong University, Shanghai, P. R. China, 1988
Major: Electrical Engineering

Presentations and Publications:


This is the first page where a page number should occur (Roman Numerals). It should be centered, bold, and 12 pt like the text. It should be ½ inch from physical bottom of the page within a footer.
DEDICATION PAGE

- Be completely personal but professional.
- Use full names with correct spelling.
- View Examples at the Library ETD web site.
Acknowledgments Page

- Spell “acknowledgment” with or without “e” between “g” and “m”; both are acceptable.
- Begin with the advisor and then committee members.
- Recognize any financial support sources. Also ask your advisor for grant support information.
- Identify scientific or other support, e.g.,
  - Valuable input that affected your research from fellow students, or others at conferences or other meetings.
  - Software (or equipment) that you received for free, were able to use or donated to do part of your work.
- Recognize friends or colleagues in your laboratory or classmates.
- Use correct spelling of names and consistent capitalization.
- Check grammar.
TABLE OF CONTENTS, LIST OF TABLES, AND LIST OF FIGURES

- Use consistent titles, punctuation and capitalization.
- Use bold for the titles above the columns only.
- Use all capitalized letters for CHAPTER TITLES.
- Enter two spaces between each chapter and section number and its title.
- Place dots consistently leading from each chapter and section title to its page number.
- Right justify page numbers (in their own column).
- Include (Continued) in parenthesis at top of second and following pages.
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Chapter Titles appear in all CAPITALS.

Provide two spaces between Chapter no. and Chapter title.

Provide two spaces between Section no. and Section title.

Provide two spaces between Sub Section no. and Sub Section title.

The Table of Content has to be created manually, and has to follow the format presented here. The Split Cells function is very helpful here.

Note: For detailed instructions, look into the Guide for Creating the Table of Contents on the Graduate Studies web page.
TEXT

- Be consistent and use third person throughout the document.
- Set margins as: left 1.5 inches; right/top/bottom, 1 inch
- Use Arial or Times New Roman fonts size 12 pt.
- Format chapters, sections, and subsections consistently.
- Enter all page numbers in the footer, 0.5 inches from the bottom located within the margin. All page numbers must be bold and 12 pt. Font styles & sizes must be identical to text.
- Number Appendix pages and Reference pages like chapters.
CHAPTER 1
INTRODUCTION

1.1 Objective

The objective of this dissertation is to present applications of space-time processing for the following multiple-access, wireless communication systems: time-division division multiple-Access (TDMA) and code division multiple-access (CDMA).

For the TDMA system, the following spatial processing techniques: optimum combining and direct matrix inverse (DMI) were reviewed; and eigenanalysis-based processing, or the eigencanceler was proposed. An analysis of system performance shows that the eigencanceler is superior to DMI when small data sets are available.

For the CDMA system, the following receiver consecrations are formulated and compared: (1) space-time maximum ratio combining (SMRC/TMRC) (in effect space-time diversity), (2) cascade optimum space-MRC time (SOPT/TMRC) (optimum spatial processing cascaded with a RAKE receiver) and (3) cascade optimum space-optimum time (SOPT/TOPT).
1.2 Background Information

Wireless communication offers universal network access by removing users' location and time constraints. As wireless networks proliferate and the subscriber community increases, the load on the network increases. The tremendous growth in network bandwidth has driven the convergence of voice, video, and data to IP based networks. The bandwidth available on wired networks is increasing by a factor...
FIGURES AND TABLES

- Use Portrait or Landscape for figures. If Landscape is used, figure should face out. Page number must still be portrait.
- A caption that describes a Figure must follow just below the Figure.
- The Title of a Table must be in a header just above the Table.
- Numbering follows the chapter (e.g., Figure 1.1 for the first figure in the first chapter).
- Samples of appropriate format are available in the sample document on the GSO web site. [http://www.njit.edu/graduatestudies/docs/thesis/doc_body_commented_v2.pdf](http://www.njit.edu/graduatestudies/docs/thesis/doc_body_commented_v2.pdf)
EQUATIONS

- Place equations between paragraphs.
- Enter double space before and after equation.
- Use Equation Editor to enter equation.
- Center equation and right justify equation number.
- Number equations in X.y form (where X is the chapter number and y is the equation number).
Table 2.1 Diffusion Coefficients and Molecular Diameters of Non-electrolytes

<table>
<thead>
<tr>
<th>Molecular Weight (g/mol)</th>
<th>Diffusivity in Solution $10^{-5} \text{ cm}^2/\text{s}$</th>
<th>Molecular Diameter $10^{-8} \text{ cm}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2.20</td>
<td>2.9</td>
</tr>
<tr>
<td>100</td>
<td>0.70</td>
<td>6.2</td>
</tr>
<tr>
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<td>0.25</td>
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<td>0.11</td>
<td>28.5</td>
</tr>
<tr>
<td>100,000</td>
<td>0.05</td>
<td>62.0</td>
</tr>
<tr>
<td>1,000,000</td>
<td>0.025</td>
<td>132.0</td>
</tr>
</tbody>
</table>


A qualitative picture of the longitudinal electric field at the axis of the electron avalanche is given in Figure 16.7. The x=0 plane corresponds to the front of the...
Equations have to have a double space before and after. They are centered and numbered in X.Y form (Where X is the Chapter number and Y is the equation number). This number has to be right justified. Use a table with one row and two columns.

\[ E=MC^2 \] (2.1)

The electron energy distribution is far from equilibrium. It is enriched with high-energy electrons, a consequence of the large electric field. Furthermore, the distribution is anisotropic in the high energy.
Figure 5.1 Specification of a simple slider, running in the VRED editor, to illustrate our graphical notation. The upper half of the screen shows the continuous portion of the specification, using ovals to represent variables, rectangles for links, and arrows for data flows. The lower portion shows the event handler in the form of a state diagram, with states represented as circles and transitions as arrows.


Figure 5.1 shows the specification of this simple slider in our visual notation,
APPENDICES

- Determine if appendix is needed in consultation with your advisor.
- Format text, sections, page numbers, figures, and tables the same as you would for a chapter.
- Provide a title and brief introductory description of what is contained in each Appendix.
- Enter Title of each Appendix in all capitalized letters.
  - For a single appendix, the title should be “APPENDIX” (no letter).
  - Multiple Appendices – “APPENDIX A”, “APPENDIX B”, and so on.
- Appendices appear before References in the document.
APPENDIX A

SAMPLING SITES

Figure A.1 to A.12 show sampling locations at YPG and APG sites.

Figure A.1 Regional Map Depicting Yuma Proving Ground (U.S. Army YPG, 1999).
REFERENCES

- Select reference styles based on degree and discipline.
  - It is advised that you ask your advisor for the most representative journal in your field.
  - Wikipedia lists citation styles per discipline: [http://en.wikipedia.org/wiki/Citation](http://en.wikipedia.org/wiki/Citation)

- Use quotation marks, *italics* or underlining properly.

- Use consistent style format, capitalization and numbers.

- End Note software can be used to organize references. Links to download the software:
TWO BASIC STYLES

- **Numerical**
  
  Use [21] in the text to cite a publication listed in the References section as:

  [21] J. Smith, Paper Title, Volume Number, Issue Number, Page number(s), Year.

- **Alphabetical**
  
  Use [SmithYear] to cite a publication listed in the References section as:

  Smith, J. Year, Paper Title, Publication Title, Volume Number, Issue Number, Page number(s).

  For book citation: Book Title, Edition, Author Name(s), Publisher, City, State, Country, Year.
PAPER QUALITY

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