The following presentation is devised to help guide students through the process of submitting their thesis or dissertation.

**OGE Student Services**
Contact The Office of Graduate Education (OGE) if you have any questions or concerns about your thesis or dissertation
Phone: 518.276.6488
Email: gradschool@rpi.edu

**Deadlines**
Refer to the [Academic Calendar](#) for important dates and deadlines.
BE SUBMISSION SAVVY!

• Electronic-Only Submission Process
• Deadlines
• Submit Your Thesis
• Before You Submit
• Requirements
• Recommendations
• Common Mistakes: General
• Common Mistakes: References/ Bibliography
• Commonly Used Style guides
• Academic Integrity
• Examples
Electronic-Only Submission Process Use the Template

Submission site: Thesis and Dissertations are now submitted online through UMI ETD Administrator at [http://www.etdadmin.com/rpi](http://www.etdadmin.com/rpi).

Fees: A $27 fee is required for submission and must be paid directly to UMI.

Supporting Documents: The forms below are required and must be submitted to OGE by the deadlines with original signatures and dates.

**Supporting Forms (MS):**
- Record of Master's Thesis & Oral Presentation
- Graduate Student Exit Survey
- 2017 Future Plans Survey (online only)

**Supporting Forms (PhD):**
- Record of Dissertation Exam
- Graduate Student Exit Survey
- Survey of Earned Doctorates Certificate
- 2017 Future Plans Survey (online only)
# Deadlines:

## Dissertation and Thesis Advisor Deadline

<table>
<thead>
<tr>
<th></th>
<th>Master’s Thesis: 11/10/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>For December 2017</td>
<td>Doctoral Dissertation: 11/03/2017</td>
</tr>
<tr>
<td>For May 2018</td>
<td>Master’s Thesis: 03/02/2018</td>
</tr>
<tr>
<td></td>
<td>Doctoral Dissertation: 03/02/2018</td>
</tr>
</tbody>
</table>

## Dissertation Defense Deadline

<table>
<thead>
<tr>
<th></th>
<th>11/21/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>For December 2017</td>
<td></td>
</tr>
<tr>
<td>For May 2018</td>
<td>03/30/2018</td>
</tr>
</tbody>
</table>

## Master’s Thesis Submission Dates

<table>
<thead>
<tr>
<th></th>
<th>11/20/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>For December 2017</td>
<td></td>
</tr>
<tr>
<td>For May 2018</td>
<td>03/30/2018</td>
</tr>
</tbody>
</table>

## Doctoral Dissertation Submission Dates

<table>
<thead>
<tr>
<th></th>
<th>12/01/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>For December 2017</td>
<td></td>
</tr>
<tr>
<td>For May 2018</td>
<td>04/13/2017</td>
</tr>
</tbody>
</table>

Your department may also have their own deadlines. Please make sure to check with your department’s GPD or GPA.
Submit Your Thesis

Please refer to our Submit Your Thesis page for all thesis/dissertation information.
Before You Submit

• Review the Preparation Manual for Dissertations and Theses available on the OGE website. Students graduating in Spring 2016 and beyond are required to follow the standards set forth in this edition of the manual.

• Contact an OGE staff member to conduct a preliminary review of the complete draft of your thesis/dissertation.
  – Reviews can be done in person or via email prior to your defense date.
  – General formatting revisions and reference recommendations can be made up front and may save the student time during the official review.

• Review the Doctoral or Master’s Checklist on the OGE website.
  – Approved forms that should already be on file: current Plan of Study, Committee form, Candidacy Examination (Doctoral students only).
  – Download or access required forms needed for submission.

• Share this information with your Advisor and Committee.

• Ask Questions & Be Proactive
Requirements

• Make sure you obtain all original signatures.
  – The Record of Master's/Dissertation Presentation Form submitted to OGE must include your citation style, have original ink signatures from your Examining Committee, and must be dated. A signed title page is no longer required.

• Submit your thesis/dissertation and paperwork by the deadline.
  – The length of time for reviews vary. Please submit your thesis or dissertation as soon as possible.
  – If you have successfully defended and want to start the review process early you may submit your thesis or dissertation before the deadline.

• Adhere strictly to your citation style guide and provide supporting documentation if possible or requested.
  – This includes in-text citations and references. The reviewer may ask you to send in your guide.
  – References of all non-original work must be cited.

• Attribute appropriately.
  – If you have work that has been previously published, submitted for publication, or currently in press, you need to include an attribution. Please refer to the Preparation Manual for Dissertations and Theses on the OGE website for examples.
Recommendations

• Avoid contacting OGE to request an extension the week of the deadline.

• Consider using a Word or Latex template.
  – The Preparation Manual for Dissertations and Theses provides more information.

• Please keep in mind OGE is responsible for the review of all submissions. A very thorough process must be completed before a decision is made.
  – Reviewers are handling several dissertations simultaneously and try their best to complete the review process in a timely manner.

• Make any changes to the final submission requested by OGE in a timely manner.
  – 24-48 hours is an appropriate timeframe to submit any required revisions.
Common Mistakes: General

• Not being familiar with, or knowing, your citation and reference style.
  – Review your citation style guide for how journals, books, conferences, online resources, personal communications, etc. are cited and referenced.
  – Review your thesis/dissertation against your style guide before submission.

• Failure to attribute your own work.

• Inappropriately citing/referencing figures and tables from another source.
  – The reader should have sufficient information to locate the original source.
  – You may be asked whether figures and tables not cited is original work.

• Failing to make sure that your text and images are within the required margins.
  – The required margins are such that the binding side (left margin) should be no less than 1 ½ inches and the top, bottom, and outside should be no less than 1 inch.

• Inconsistency
  – Captions, font size, text alignment, capitalization, and usage of delimiters should all be consistent throughout the body of your thesis/dissertation.
Common Mistakes: References/Bibliography

**Book Chapter (Chicago Manual of Style)**

*Incorrect Example:*

*Corrected Example:*


*Incorrect Example:*
M. Ferris and T. Munson, Feb. 2000, “Complementarity problems in gams and the path solver,” *J. Econ. Dynamics and Control*, vol. 24, no. 2, pp. 165-188. *(Date is not in the correct location)*

*Corrected Example:*
Abbreviations (Journal of the Acoustical Society of America (JASA))

Note the differences below. Some style guides, such as JASA, require the abbreviation of Journal titles. Review your style guide to determine if Journal titles should be abbreviated

**Incorrect Example:**

**Correct Example:**

Online references (Chicago Manual of Style)

For online references, you must specify all protocols. Please list the appropriate ones (http://:, https://:, ftp, etc.) as a part of the URLs. The URL should not be underlined, a different font, or in a different color.

**Incorrect Example:**

**Correct example:**
Name convention (American Institute of Physics (AIP) Style Manual)

AIP Style Manual requires author’s first name initial, then full last name.

**Incorrect Example:**
*(Student writes last name, first name)*

**Corrected Example:**

Name convention (American Psychological Association (APA) Style Guide)

APA Style Guide requires full last name followed by first name initials.

**Incorrect Example:**
*(Student writes last name initial, full first name, middle initial)*

**Corrected Example:**
Commonly Used Style Guides

- American Chemical Society
- American Institute of Physics (AIP)
- American Psychological Association (APA)
- Chicago Manual of Style
- IEEE Editorial Style Manual
- Journal of the Acoustical Society of America (JASA)
- Modern Language Association (MLA)

If you are unsure which citation style you should be using, please consult with your Advisor or your department’s Graduate Program Director.
Academic Integrity

• Academic integrity checks are conducted during the official review process. This is to check for any instances of plagiarism or self plagiarism.
  
  – **Plagiarism**: Taking someone else’s work, idea, or text without properly giving credit.
  
  – **Self-plagiarism**: Using your own previously published work verbatim without indicating via chapter attributions.

• When a work is referenced, it must be cited appropriately in the body of the thesis according to the guidelines provided in the chosen citation style guide.

• If self-plagiarism is found, the student will be given a chance to correct his/her work before the next submission is sent to OGE.

• Plagiarism is a serious offense. The procedures that are followed are outlined in the [Graduate Student Supplement to the Handbook of Rights and Responsibilities](#).
Quorum-Sensing Repressor-Based Tools for Cell-Cell Communication in Synthetic Biology

Thesis by

In Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

The title page is not in accordance with OGE guidelines.
1 Background

Light emitting diode (LED) technology is gaining acceptance as the light source for a variety of applications [1]. Energy savings, color tunability, ease of developing controls and long life times are some of the claimed advantages of this technology [2], [3]. Many innovations have emerged in the LED lighting space, utilizing many unique features of LEDs to enhance delivered value to users. Presently, the LED lighting industry defines the life as the time taken for the light level to depreciate to 70% of the initial value [4]. However, in practical applications there is no means to know when a light source has reached end of life based on this definition. Furthermore, in applications a system can reach end-of-life by ceasing to produce any light, known as catastrophic failure. Such failures are problematic in certain critical applications. In aviation, aerospace, automotive, street lighting, signaling and industrial applications, unscheduled failures of lighting systems compromise safety and increase operational costs [5], [6], [7], [8]. Therefore, an early warning methodology could improve safety, and reduce operational costs.

Such a feature built into a fixture enhances the delivered value to users of lighting systems where cost of failure and cost of maintenance is critical. The main questions is, what key parameters in an LED package can be measured in real time that could provide reliable indication that the LED package is about to fail. Therefore, the goal of this dissertation is to identify electrical and thermal parameters of an LED package that can be used for predicting failure ahead of failure while in use.

An LED lighting system is composed of many different sub-systems, such as LED packages, a thermal management system, secondary optics, and an electrical driver unit. Failure of one of these sub-systems would affect the performance of an LED lighting system. Each of these sub-systems consists of many different components. This dissertation focuses on catastrophic failure prediction of an LED package when subjected to temperature and current stress conditions.

Degradation of contacts in the LED package could lead to catastrophic failure and the probability of contact failures is significant in the reliability assessments. Further, emerging trends in LED packaging industry such as, high density packaging, high temperature rated LED packages, and high current density packages have made reliability of electrical and thermal contacts a significant concern.

Electrical and thermal parameters indicate the health of the package's electrical and thermal conduction paths. Therefore, measuring and analyzing the changes of these parameters could act as early predictors of catastrophic failure. Further, these parameters can be measured real-time within the application environment, reliably at reasonable accuracies. The systematic study of these parameters during early and late stages
Florida to Texas, much of it due to the storm surge. The most significant number of deaths occurred in New Orleans, Louisiana, which flooded as the levee system catastrophically failed; in many cases hours after the storm had moved inland [1]. Eventually 80% of the city and large tracts of neighboring parishes became flooded, and the floodwaters lingered for weeks. However, the worst property damage occurred in coastal areas, such as most Mississippi beachfront towns, which were flooded over 90% in hours, as boats and casino barges rammed buildings, pushing cars and houses inland, with waters reaching 6–12 miles (10–19 km) from the beach. The hurricane surge protection failures in New Orleans was considered by many to be the worst civil engineering disaster in U.S. history [3], and prompted a lawsuit against the U.S. Army Corps of Engineers (USACE), the designers and builders of the levee system as mandated by the Flood Control Act of 1965.

Several agencies including the U.S. Army Corps of Engineers (USACE), Federal Emergency Management Agency (FEMA), New Orleans Police Department (NOPD), United States Coast Guard (USCG), National Hurricane Center (NHC), and National Weather Service (NWS) were dealing with the hurricane. They provided accurate hurricane weather tracking forecasts with sufficient lead time; but unfortunately, even the most insistent appeals from national, state and local public officials to residents to evacuate before the storm did not warn that the levees could breach and fail. Figure 1.1 shows how critical are the levees for a city like New Orleans. Based on all different reports and investigations, it can be said that the main reason for all the mentioned damages and losses is the failure of the levees.

There are several other examples that reveal the critical role of levees and embankment dams, and their failure impact on people’s lives and properties. There are nearly 14,000 miles of levees under U.S. Army Corps of Engineers (USACE) jurisdiction in U.S.; but it does not include what is believed to be more than 100,000 additional miles of levees not covered by the Corps’ safety program. Some are little more than mounds of earth piled up more than a century ago to protect farm fields. Others extend for miles and are made of concrete and steel, with sophisticated pump and drainage systems. They shield homes, businesses and infrastructure such as highways and power plants. Figure 1.2 shows that 881 counties with a total population of 160 million in the United States are protected by levees.

Figure 1.1: Vertical cross-section of New Orleans, showing maximum levee height of 23 feet (7 m). Vertical scale exaggerated (Image from The full wiki, [4])

Figure 1.2: United States counties protected by levees (Image from Levez.org, [5])

The national flood-control infrastructure is aging and its structural health is deteriorating. The ASCE’s 2009 Report Card for America’s Infrastructure gave the
In some cases, the initial stages there is no significant reaction, but after that the degradation process is rapid and can lead to catastrophic failure [48]. The slope of the Arrhenius plot determines the activation energy [47].

2.3.2 Determination of Activation energy

The rate of a first-order chemical reaction is given by:

$$k_{re} = A \cdot e^{-\frac{E_a}{RT}}$$  \hspace{1cm} (2.0)

where:
- $k_{re}$ – Rate constant for the photo-dissociation
- $A$ – A constant related to the probability of the reaction occurring at any given temperature
- $E_a$ – Arrhenius Activation energy, usually in electron-Volts
- $k$ – Boltzmann’s constant, 8.6171 X 10^{-5} electron-Volt per °C
- $T$ – Temperature in Kelvin

For an LED, the activation energy can be determined by using the failure definition, L%, time for 30% decay in light output for a particular temperature. The Mean Time Between Failure (MTBF) can be written as:

$$MTBF = \tau = \frac{\Delta t}{A \cdot e^{\frac{E_a}{RT}}}$$  \hspace{1cm} (2.1)

where
- $A$ – Constant
- $E_a$ – Activation energy (eV) for the reaction
- $k_B$ – Boltzmann constant (0.0000861 eV/K)
- $T$ – Temperature in Kelvin ($K = °C + 273$)

The time constant of the degradation process decreases with increasing in temperature [48].

Previous studies have shown that the degradation rate depends on the temperature when samples were subjected to purely thermal stress [10]. In the case of white LEDs the degradation showed an exponential trend [9], [10]. Past studies have determined the activation energy to be 0.18 eV for low power LEDs and 0.92 eV for high power LEDs [19], [23], [48],[49]. The difference in the activation energy was
1. Introduction

Today light emitting diode (LED) technology is a preferred light source in many applications such as displays, signage, and general lighting owing to its energy saving potential and reduced maintenance cost. The phosphor down conversion technique is one of the common ways to obtain white light using LED [1].

1.1 Phosphor Converted White LED

Figure 1.1 shows the basic structure of the first white LED with a phosphor layer surrounding a blue LED chip [1].

The most common white LED phosphor is cerium doped yttrium aluminum garnet, $Y_3Al_5O_{12}:Ce^{3+}$; known as YAG:Ce. The emission spectrum of the p2-white LED is very broad with two peaks, near 460 nm and near 560 nm as shown in Figure 1.2.

![Figure 1.1 Structure of white LED [1].](image)

![Figure 1.2 Blue LED + YAG:Ce white LED spectrum [1].](image)

A delimiter is missing from the Figure numbers.
Figure 4.1: Clustering of EGF-1 and EGF-20 data sets based on morphological features. It is observed that cluster 1 is characteristic of smaller buds and shallower clefts, whereas cluster 2 is characteristic of larger buds and deeper clefts. The majority of EGF-1 data sets are present in cluster 2, whereas the majority of EGF-20 data sets are present in cluster 1. Image courtesy: Dhulidar et al [1].

able to represent the morphological changes that occur in the SMG during branching morphogenesis. Table 2 shows multiple clustering measures including recall and precision, F-score, and entropy [34].

<table>
<thead>
<tr>
<th>Cluster1</th>
<th>Recall</th>
<th>Purity</th>
<th>F-score</th>
<th>Entropy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.87</td>
<td>0.57</td>
<td>0.66</td>
<td>0.80</td>
</tr>
<tr>
<td>Cluster2</td>
<td>0.69</td>
<td>0.92</td>
<td>0.76</td>
<td>0.41</td>
</tr>
</tbody>
</table>

4.2 Control versus Treated Classification

The dataset containing twenty images each of control and treated glands was used to build a classifier that can distinguish between the two sets using both spatial and Fourier domain features. The previous work on classification of the control versus treated glands by Bilgin et al [3] used cellular and shape-based features for portions of this chapter is to appear in: N Dhulidar, S Ray, D Youn et al., “Prediction of growth factor dependent cleft formation during branching morphogenesis using a dynamic graph based growth model,” July 2013, submitted to PLOS Computational Biology.
The table is outside the margin, and the tables are not in the correct numerical order.

Table 4.11: Fourier based results for classifier and number of frequency regions

<table>
<thead>
<tr>
<th>Regions</th>
<th>Linear</th>
<th>diagLinear</th>
<th>Quadratic</th>
<th>DiagQuadratic</th>
<th>Mahalanobis</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>81.37</td>
<td>81.37</td>
<td>85.27</td>
<td>87.25</td>
<td>88.73</td>
</tr>
<tr>
<td>3</td>
<td>82.35</td>
<td>81.37</td>
<td>85.29</td>
<td>86.27</td>
<td>87.24</td>
</tr>
<tr>
<td>4</td>
<td>82.35</td>
<td>83.33</td>
<td>85.78</td>
<td>87.25</td>
<td>87.25</td>
</tr>
<tr>
<td>5</td>
<td>81.3</td>
<td>81.37</td>
<td>86.27</td>
<td>87.25</td>
<td>87.76</td>
</tr>
</tbody>
</table>

Table 4.10: Confusion matrix for shape based features with feature selection

<table>
<thead>
<tr>
<th>Actual</th>
<th>Predicted</th>
<th>Initial</th>
<th>Progressive</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>78</td>
<td>7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Progressive</td>
<td>4</td>
<td>66</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Terminal</td>
<td>0</td>
<td>2</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>

4.3.2 Fourier coefficients based features and analysis

Fourier transform is computed on the signals for each of the three categories i.e. initial, progressive and terminal. The relative energy feature is computed for different number of frequency regions after a parametric search from two to five regions.
A space is missing between the delimiters and captions.


Questions?

We hope that these slides and other materials on the OGE website will assist you as you prepare your thesis/dissertation. Best of luck during this final stage!

The Office of Graduate Education (OGE)
Phone: 518.276.6488
Email: gradschool@rpi.edu

Please indicate “thesis/dissertation question” in the subject line.