

# Gonzaga University Masters in Engineering in Transmission and Distribution Engineering



Graduate Student Handbook 2011-2012

## ACKNOWLEDGMENT

The contents of this handbook were written or compiled by the staff of the T&D Engineering program. All University policies, practices and procedures are consistent with Gonzaga's Jesuit, Catholic identity and Mission Statement.

This handbook is intended to provide general information to graduate students attending the T&D Engineering program at Gonzaga University.

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Disclaimer: The Dean of the School of Engineering & Applied Science reserves the right to change any of the policies and procedures included in this Student Handbook at any time.

## Table of Contents

Content:	Page:
Table of Contents	3
SEAS Mission	4
SEAS Educational Objectives	4
T&D Program Goals	4
Program Contacts	5
Admission Requirements	5
Degree Requirements	5
Notification to Graduate	6
Program Curriculum	6
Advisor	6
Portfolio	6
Course Expectations	6
Late Homework Policy	6
Zagweb	7
Transfer of Credits	7
Withdrawal from Program	8
Tuition Reimbursement	8
Foley Library	8
Academic Integrity	8
Available Support Services	8
Disability Resources	8
Harassment Policy	9
Statement of Non-Discrimination	9
Commitment to Human Diversity	9
Appendix A: Course Descriptions	10
Appendix B: Program Outline	12
Appendix C: Graduation Planning Worksheet	13

## **School of Engineering Mission**

Our Mission:

The School of Engineering and Applied Science produces broadly educated and capable engineers ready to contribute innovative solutions for a better world.

### **School of Engineering & Applied Science Educational Objectives**

Engineers educated at Gonzaga University will:

- Develop engineered solutions that are well-conceived and carefully implemented to meet public and private sector needs.
- Contribute effectively to organizations as leaders and/or team members.
- Foster personal and organizational success in a dynamic, globalized professional environment.
- Improve society by applying Jesuit, humanistic values to their professional and civic responsibilities.

These four Objectives encompass the broad areas in which we believe our graduates will contribute to society in their careers and professions.

### **T&D Program Goals**

Students educated in Gonzaga University's Masters in Engineering in Transmission and Distribution Engineering will be able to:

- Identify, formulate and solve power engineering problems through application of fundamental and broad principles and techniques from mathematics, sciences and engineering with primary attention being focused on applications in designing, maintaining and improving the nation's electric power grid.
- Formulate a rational approach to develop and evaluate design solutions; to apply analytical, computational and experimental methods along with sound judgment to develop effective design solutions to complex, open-ended problems in power engineering.
- Participate effectively as a member of a team in projects that may involve multidisciplinary activities within the power industry.
- Communicate effectively through verbal and written means; to make effective oral/visual technical presentations to peers and management; to prepare technical summaries and detailed written reports that describe and document engineering studies.
- Conduct their power engineering work in a professional manner, cognizant of related ethical and contemporary issues and to continually improve their capabilities through lifelong learning.
- Successfully pursue careers in the power industry and its related fields to serve the Pacific Northwest, the nation, and the international community in a wide range of careers.
- To help students reach their fullest potential by helping them fully understand and appreciate the Jesuit mission with regards to life, leadership and service to others, while emphasizing an appreciation for the importance of designing and protecting a reliable, innovative national power grid.

## T&D Engineering Program Contacts

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## T&D Engineering Program Information

### Admission:

Admission to the program will be administered by faculty and staff of the T&D Program. An undergraduate degree in engineering (or related field), two letters of recommendation from immediate managers or supervisors, and a letter of intent expressing the student's qualifications, professional goals, and employment experience will be required to enter the program. Preferred consideration for admission will be given to applications with industry experience that have completed the T&D Certificate Program.

### Admission Checklist:

- Letter of intent
- Transcripts from all relevant university coursework
- GRE test score (for those without a T&D Certificate)
- Two letters of recommendation
- Application form submitted
- Application fee

### Degree Requirements:

The Master of Engineering in T&D Engineering is a 36-credit hour degree program. Students are required to complete a total of 12 courses - three core (from the student's chosen track of Transmission or Distribution); and seven from the remaining selection of T&D Program courses, (including the TADP 556 capstone course). The final two courses may be from the T&D program, approved courses from GU's Business or Organizational Leadership programs, or approved graduate courses from other universities. Once admitted to the T&D program students will be given six years to complete their degree.

To receive an M.E. Degree in T&D Engineering the student must have an average cumulative grade point of 3.0 or better in the T&D program. Prior to being awarded their degree each student is encouraged to participate in the campus visit associated with the Engineering Leadership course.

Basic requirements for completion and award of the degree are 36 credits of coursework including:

- A cumulative grade point average of at least 3.0 in the program
- Nine credits of core courses (Transmission or Distribution Track)
- Eighteen credits of elective T&D Program courses (list attached)

- Six credits of other T&D graduate courses or approved Business or Organizational Leadership courses
- TADP 556 Engineering Leadership Capstone course
- A portfolio is required as the culminating project

**Notification of Intent to Graduate:**

Degrees are granted at the end of each semester: Fall (December), Spring (May), and Summer (August). Students are expected to apply to graduate through the T&D Director. Please observe appropriate deadlines for application for graduation. Formal commencement ceremonies are held in May each year, and graduating students are invited to participate, regardless of the semester their degree is granted. Graduation details can be found at <http://www.gonzaga.edu/Current+Students/Commencement/Graduate/grad1.htm>

**Program Curriculum:**

To meet the needs of our non-traditional students all T&D courses are accelerated over an eight week period, instead of a traditional 15-week semester. Teaching methodology and course delivery have also focused on the needs of adult engineering professionals. On-line lectures (presentations) are released for viewing each Monday and the corresponding homework assignments are due the following Sunday. Students can therefore review lecture material and work on assignments anytime throughout the week or weekend as their individual needs dictate.

**Advisor:**

Students must choose a faculty advisor before completing 18 credits of the T&D master's degree. An approved list of advisors is available from the program. This advisor will review the student portfolio and recommend for T&D graduate committee review.

**Portfolio:**

The ME in T&D Engineering requires a portfolio of appropriate coursework for graduation. Students may choose the final projects from three courses in their chosen track to submit, with their communication plan and mission statement from TADP 556, as their portfolio. A faculty committee will review the portfolio and recommend for graduation or further work. Two paper copies of the portfolio and an electronic PDF copy must be submitted to the Director eight weeks prior to completion of all coursework.

**Course Descriptions:** See Appendix A

**Course Expectations:**

The T&D courses are regular, graduate level courses which would normally be offered over a 15 week period but has been condensed into 8 weeks. This means students should be prepared to spend several hours each week viewing lecture presentations and materials. Students should also be prepared for 2 hours of individual study for each hour of presentations. While instructors are here to help students with questions, this is a graduate level course and as such will require a high level of individual accountability in completing the course.

**Late Homework Grading Policy:**

Because this is a graduate level program for industry professionals, homework assignments must be turned in on time. Assignments turned in less than 48 hours past the deadline will be automatically deducted 20 percent of the possible points. (A perfect solution for a 5 point problem would earn 4 points, a solution earning 4 out of 5 points would receive 3 points).

Assignments turned in between 2 and 5 days late can receive no more than 50 percent of the eligible points.

Once the solution is posted, no points may be given for the assignment. This allows instructors the opportunity to post homework solutions for the class in a timely manner to build upon earned knowledge through the course. If you foresee a problem with turning an assignment in on time due to work or family crisis, please inform instructors before the due date to make arrangements to avoid penalty.

**Zagweb:**

Students can register for classes, access student account information, pay their bills and view unofficial transcripts in Zagweb. (Web address: zagweb.gonzaga.edu).

Regarding student accounts- Students should receive a statement from student accounts to their Zagmail account. Students have two weeks from receiving that statement to pay without penalty. Payment can be made online through the Zagweb site but students have mentioned there is a substantial fee if paying by credit card. Students may pay via "echeck" though in the same area of Zagweb without the fee.

To sign into Zagweb, students may use their social security or student ID number for the user ID. The password is their six digit birthday. Enter the "secure area", click on the electronic billing option. Click "review billing statement/make a payment" at bottom of screen. It will take you to Quikpay and one of the payment options is echeck.

To simply view a statement in Zagweb, click Student and Financial Aid link (NOT electronic billing and payment), then Student Records, then Account Summary by Term. To view transcripts- enter secure area, then student & financial aid area, then student records, then academic transcripts.

**Transfer of Credits:**

Students may apply up to six semester credits from another accredited college or university toward the M.E. in T&D Engineering. Courses must be clearly graduate level as defined by the granting institution. Courses may not have been used toward any other degree. The subject matter of courses transferred, if they meet a program requirement, can be substituted for an elective that is appropriate to the program, which is determined by evaluation of program Director. The date of each course considered needs to be within 5 years of the beginning semester at Gonzaga. No course for which a grade less than "B" has been awarded may be accepted. Classes graded on a Pass/ Fail scale will not be considered unless Pass is equivalent to "B".

**The following guidelines are recommended when attempting to transfer credits:**

- The student attempting to transfer credits to Gonzaga University should submit transcripts and course syllabus to the program Director for transfer credit approval.
- The Director will review these materials or present them to the faculty regularly responsible for teaching the courses related to the requested transfer. If the materials are deemed comparable to the courses offered through the graduate program, then full or partial credit may be advised to the Dean of the School of Engineering & Applied Science.

Note: The transfer of credit, if allowed, will be entered into the student's record when 12 credits have been completed within the master's program.

**Withdrawal from Master's Program:**

For withdrawal from the T&D Engineering master's program you may submit the form located on our webpage: [www.gonzaga.edu/tandd](http://www.gonzaga.edu/tandd).

**Tuition Reimbursement:**

Due to the abbreviated nature (8 weeks) of this course, students may receive full tuition refund for the first two weeks of class. Students may receive a 50% reimbursement through the third week of class. After that, full tuition payment will be required.

**Foley Library:**

Gonzaga students have access to the Foley Library and its online resources. Here is the link to the library's homepage: [www.foley.gonzaga.edu](http://www.foley.gonzaga.edu). For additional information about using the library from off-campus, visit the Distance Library Services page: [www.foley.gonzaga.edu/distant](http://www.foley.gonzaga.edu/distant). If students run into problems, they may contact Theresa Kappus, Distance Services Librarian, at [kappus@gonzaga.edu](mailto:kappus@gonzaga.edu) or call the library's toll-free number: 800-498-5941.

**IEEE Standards at Foley Library:**

Students may access IEEE standards by going to the Gonzaga Foley Library website at: <http://www.gonzaga.edu/Academics/Libraries/Foley+Library/default.asp> One way to get there is to choose "Databases A to Z", then scroll down to IEEE. Click it. If students are on campus they'll go straight to the IEEE page, if students are off campus, it will ask for their network username and password first. This is the same info used to log onto your Zagmail account. From there students can do a browse or a search. If you have any trouble, or more direction, please contact the Foley Library staff, Konny Thompson at [thompson@gonzaga.edu](mailto:thompson@gonzaga.edu).

**Academic integrity:**

Gonzaga University's academic integrity policy is outlined in the student handbook at the following website. [http://www.law.gonzaga.edu/students/student\\_handbook.asp](http://www.law.gonzaga.edu/students/student_handbook.asp)

**Available Support Services:**

Student Handbook: [http://www.law.gonzaga.edu/students/student\\_handbook.asp](http://www.law.gonzaga.edu/students/student_handbook.asp)

Academic Services: <http://www.gonzaga.edu/Campus+Resources/Offices+and+Services+A-Z/Academic+Services+Office/default.asp>

Registrar: <http://www.gonzaga.edu/Campus+Resources/Offices+and+Services+A-Z/Registrar/default.asp>

School of Engineering and Applied Science:

<http://www.gonzaga.edu/Academics/Colleges+and+Schools/School+of+Engineering+and+Applied+Science/default.asp>

Transmission and Distribution Program: <http://www.eng.gonzaga.edu/tandd/>

**Disability Support Services:**

Disabilities Support Services (DSS) provides access to Gonzaga University's programs, services, activities, and facilities for qualified students with disabilities in compliance with the Americans with Disabilities Act, Section 504 of the Rehabilitation Act of 1973 and Washington

State laws. DSS may arrange or provide appropriate academic adjustments, reasonable accommodations, auxiliary aids, assistive technology, advocacy, and other types of assistance for students with disabilities.

Students should contact DSS to inquire about the procedure for securing academic adjustments or accommodations. Students must contact DSS at least six weeks prior to the semester for which they are requesting services.

If at any time during the process of application, admission, and enrollment, individuals feel that they have been discriminated against because of a disability, they are encouraged to notify the DSS Director. Incidents which have occurred more than 120 days prior to making the complaint may or may not be given consideration. To obtain copies of GU's Informal Complaint Process for Reasonable Accommodation or the Formal Grievance Procedure, please contact the DSS Director. The Disabilities Support Services is located in Foley Library 2nd Floor, East Side. Call (509) 313-4134.

### **Harassment Policy:**

For information on the Harassment Policy at Gonzaga University please view the following website: <http://www.gonzaga.edu/Student+Life/Student+Handbook/Policies+and+Procedures/Student+Conduct+Standards/Harassment+Policy.htm>

### **Gonzaga University's Statement on Non-Discrimination:**

Gonzaga University subscribes to the principles and laws of the federal government and Washington State pertaining to civil rights and equal opportunity. The University does not discriminate against any person on the basis of race, religion, gender, national origin, age, marital or veteran status, sexual orientation, a physical or mental impairment that limits a major life activity, or any other non-merit factor in employment, educational programs or activities which it operates. All University policies, practices, and procedures are consistent with Gonzaga's Catholic, Jesuit identity and Mission Statement.

As a church-related institution, in conformity with Federal and State law, Gonzaga reserves the right to take religious faith into consideration where it is deemed appropriate.

### **Gonzaga University's Commitment to Human Diversity:**

Gonzaga University's distinguished tradition of humanistic, Catholic, and Jesuit education recognizes that all human beings have the same sacred origin, nature, and inherent dignity regardless of race, sex, religion, nationality, economic status, or other differences. The University believes in the principles of holistic education and strives to provide all community members with opportunities for a variety of experiences from which they can learn and grow.

The University recognizes that the quality of education as well as the growth and development of the human person is enhanced by awareness of and learning from persons with different experiences, backgrounds, and ideas. This approach equips all community members, especially its graduates, to understand and relate to persons from all cultures and backgrounds. The University is committed to promoting awareness and acceptance of human diversity. The University further strives to provide an environment in which all members can reap the educational and experiential benefits of a diverse community whose members reflect a variety of cultures, backgrounds, ideas, and values consistent with the University's traditions and Mission Statement.

## Appendix A

### **T&D Program - Course Descriptions:**

TADP 540 - Transmission Line Design- Introduction: Structures, foundation design, conductors, survey techniques, terrain modeling, computer-aided design, NESC code requirements. Students will design sag and tension template by hand and spot a new transmission line.

TADP 541 - Electrical Distribution System Design: Distribution System concepts, line and substation design, network planning, conductor sizing, transformer specification & connections, arrestors, underground cabling, substation overview, protection/fusing. Short circuit, load flow, reactive compensation and harmonic analysis. Integration of renewable and distributed generation into the grid.

TADP 542 - Substation Design: System overview, design principles, types of substations, components, utilization, scoping a project, project plan, site, scheduling, major equipment, control houses.

TADP 543 - Electrical Grid Operations: NERC/WECC reliability standards, control area, operation, outage coordination planning, switch theory and devices, reactive load balancing, generation load balancing, per-unit system, network modeling, power flow analysis, system disturbance analysis, and seasonal ratings.

TADP 544 - Project Development and Construction Methods: Project development, project proposals to management, project initiation, scheduling, cost management, resource management, permitting authority, land rights acquisition, overview of contracts, contractor selection, and project status tracking.

TADP 545 - System Protection: General concepts, voltage and current transformers for protection, classification and functionality of relays, overcurrent protection, distribution feeder protection, high voltage line protection with distance relaying, transformer protection, generator protection, testing and commissioning. (Prerequisite: TADP 641 or Director Permission)

TADP 547 – Underground System Design: Introduction to Cable Systems, history of cables, solid dielectric history, comparison of overhead versus underground systems, type of cable systems, accessories, manufacturing, basic cable design, installation practice, application considerations.

TADP 548 - Transmission Line Design- Electrical Aspects: Rules and requirements, design criteria & voltage levels, conductor selection & ratings, clearances, REA manual, insulation, voltage flashover, EMF fields, corona, induction coordination, grounding requirements, pole grounding, guy wire grounding, grounding measurements.

TADP 553 - System Automation: Economic benefits, reliability, safety, equipment costs, communication, transmission automation, distribution automation, under frequency load shedding, radial overhead, radial loop underground, demand side management, remote connect/disconnect, SmartGrid, consumer automation, network design aspects.

TADP 556 - Engineering Leadership: The T&D student has followed a course of study that has deepened their understanding in some highly technical areas. Paradoxically, these same skills

will vault them into positions where they will have to lead. What are the benchmarks and hallmarks of leadership, especially in technical leadership? Leaders at any level are agents for change and transformative. This course provides some theory, practical framework and some tools that support a deeper understanding of leadership. Topics will include leadership roles and responsibilities, communication, systems thinking and breakthrough leadership, leadership, change and ethics. (Capstone)

TADP 640 - Transmission Line Design - Advanced: Guyed structures, lattice towers, steel poles, soil properties & foundations under compression, foundations under lateral load, foundations under uplift, advanced sag and tension, special problems in sag and tension, LiDAR technology. (Prerequisite: TADP 540)

TADP 641 - Power System Analysis: Power system modeling, short circuit calculations, load flow algorithms and methods, and harmonic analysis and filter design. Case studies on voltage regulation, VAR control, and relay setting and coordination. Basic concepts of power systems, their components and how they are inter-related. Overview to the topology and players of the North American power grid.

# Appendix B Program Outline

## Course Requirements

Thirty-six (36) credits total;

- 33\* in T&D courses, including at least 9 in chosen track (used toward graduation portfolio)  
\*students may substitute 6 credits from pre-approved MBA and ORGL courses.
- 3 in TADP 556 Capstone

### 1. Required core courses provide basic tools for power industry engineering design.

#### Transmission Track Courses

TADP 540	Transmission Line Design-Introduction	3 credits
TADP 543	Electric Grid Operations	3 credits
TADP 544	Project Development & Construction Methods	3 credits
TADP 547	Underground System Design	3 credits
TADP 548	Transmission Line Design-Electrical Aspects	3 credits
TADP 640	Transmission Line Design-Advanced*	3 credits

#### Distribution Track Courses

TADP 541	Distribution System Design	3 credits
TADP 542	Substation Design	3 credits
TADP 545	System Protection**	3 credits
TADP 547	Underground System Design	3 credits
TADP 553	System Automation	3 credits
TADP 641	Power System Analysis	3 credits

#### Capstone Course

TADP 556	Engineering Leadership	3 credits
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#### Approved MBA & ORGL electives

MBUS 612	Management Skills Development	2 credits
MBUS 614	Business Ethics	2 credits
MBUS 616	Strategic Management	2 credits
MBUS 625	Operations Theory & Practice	2 credits
ORGL 500	Organizational Leadership	3 credits
ORGL 503	Organizational Ethics	3 credits
ORGL 504	Organizational Communication	3 credits
ORGL 505	Organizational Theory	3 credits

\*Prerequisite TADP 540

\*\* Prerequisite TADP 641 or Program Director permission

### 2. Advisor

Students must choose a faculty advisor before completing 18 credits of the T&D master's degree. An approved list of advisors is available from the program. This advisor will review the student portfolio and recommend for committee review.

### 3. A portfolio is required as the culminating project.

As a final portfolio, students may choose the final project from three courses in their chosen track, a communication plan, and a mission statement from TADP 556. A faculty committee will review the portfolio and recommend for graduation or further work.

## Appendix C T&D Engineering Graduate Planning Sheet

Name:

Student ID:

Advisor:

Course #	Course Title	Date Completed	Grade	Credits
<b>Core Courses:</b>				
<b>Capstone:</b>				
TADP 556	Engineering Leadership			
<b>T/D Track Electives:</b>				