



**The University of Texas at El Paso**  
**Department of Electrical and Computer Engineering**  
EE 4395/5390 - Special Topics in Electrical Engr:  
Transmission Power Flow Control  
Spring 2023

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**Office Hours:** 5:00-6:00pm on Wednesdays

**Course Description:** National Academy of Engineering refers to the North American electric power grid as the largest and most complex machines that has ever been built. Interconnectivity of this system is the main source of complexity, connecting a large geographical area through over 200,000 miles of high voltage transmission lines. This course focuses on the transmission network, physics of power flow, as well as economic implications of transmission congestion. Mathematical modeling of the transmission system is at the heart of this course. Since power system operation is an optimization problem, basics of linear programming will also be reviewed. After taking this class, students should have a good understanding of how the transmission network is modeled in power system operation tools, how congestion is created, and what the economic implications of transmission bottlenecks are.

**Textbook:** There is no required textbook for this course. I will upload all class notes to Blackboard and everything will be covered in the class notes. The following book can be used as a reference for part of the course material: *Allen Wood, Bruce Wollenberg, and Gerald Sheblé, "Power Generation, Operation, and Control," 3<sup>rd</sup> Edition, New York: Wiley, 2013.*

**Topics to be Covered (Tentative):**

1. Basics of power system
2. A review of microeconomics and electricity market
3. Programming skills that are needed for this course
4. Linear optimization
5. Physics of power flow
6. Optimal power flow
7. Unit commitment

**Grading Policy:**

|          |   |
|----------|---|
| 90 – 100 | A |
| 80 – 89  | B |
| 70 – 79  | C |
| 60 – 70  | D |
| < 60     | F |



For EE 4395:

|               |  |
|---------------|--|
| Homework      | 20%. If for some reason you cannot finish the homework on the due date, the grade will be reduced proportionately to the days passed after the due date (10% off for each day passed). |
| Two Exams     | 25% each   |
| Final Project | 20% (there will be a bonus of up to 10% if the final paper is submitted to a conference or journal.)   |
| Attendance    | 10% (each unexcused absence takes 3%.)   |

For EE 5390:

|               |  |
|---------------|--|
| Homework      | 20%. If for some reason you cannot finish the homework on the due date, the grade will be reduced proportionately to the days passed after the due date (10% off for each day passed). Students who take EE 5390 will need to do one more homework assignment than those who take EE 4395. |
| Two Exams     | 25% each   |
| Final Project | 20% (there will be a bonus of up to 10% if the final paper is submitted to a conference or journal.)   |
| Attendance    | 10% (each unexcused absence takes 3%.)   |

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