

# Locational Marginal Pricing

Prof. Ross Baldick

The University of Texas at Austin,  
Department of Electrical and Computer Engineering ,  
baldick@ece.utexas.edu

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## 1. Course Description & Prerequisites

This class will focus on a series of topics related to Locational Marginal Pricing. Information presented in the course “[Restructured Electricity Markets: Locational Marginal Pricing](#)” will be used as background material and will be assumed as already known.

## 2. Course Outline

**First time slot:** Recent [history](#) of electricity market restructuring in Texas.

1. Milestones in Texas electricity restructuring (15 minutes)  
[Offer](#)-based economic dispatch in the absence of transmission constraints.
2. Introduction to the basics of offer-based economic dispatch, including notation to be used for the rest of the course (75 minutes).
  - Surplus
  - Feasible production set
  - Need for centralized coordination
  - Optimization formulation
  - Generation offers
  - Demand specification
  - Demand bids
  - Dispatch calculation
  - Pricing rule
  - Incentives
  - Dispatch supporting prices
  - Value of lost load and implications for pricing and incentives

**Second time slot:** Generalizations of offer-based economic dispatch.

This section will generalize the basic formulation to the case where there are multiple commodities. This will be the bridge to considering

1. Transmission constraints (90 minutes):
  - Ancillary services: reserves and regulation
  - Decision variables
  - Generator constraints
  - System constraints
  - Commodities

**Third time slot:** [Locational](#) marginal pricing (90 minutes).

1. This will be the core material on locational pricing.
  - Optimal power flow
  - DC optimal power flow
  - Offer-based optimal power flow
  - Examples

**Fourth time slot:** LMP continued and introduction to hedging

1. Locational marginal pricing, continued (30 minutes).
  - Properties of locational marginal prices
  - Congestion rent (merchandising surplus) and congestion cost
  - Contingency (or security) constraints
2. Introduction to [hedging](#) of energy and transmission price risk (60 minutes).
  - Volatility of energy prices
  - Forward markets
  - Contracts for differences
  - Relationship to capital formation
  - Transmission prices
  - Financial transmission rights
  - Revenue adequacy

Optional additional topics:

- Transmission planning
- Highlighting the recent developments of transmission for wind in Texas

### 3. References

This class will cover topics from a number of fields. Consequently the course slides will be the main material used. More literature and online slides at

<http://users.ece.utexas.edu/~baldick/classes/394V/EE394V.html>