



University of Kurdistan  
Department of Electrical Engineering

# Wide-Area Power System Monitoring and Control

(Spring 2019)

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## Course Description

Wide-area power system monitoring and control (WAPSMC) is an important issue in modern electric power system design and operation; and is becoming more significant today due to the increasing size, changing structure, introduction of renewable energy sources, distributed smart/micro grids, environmental constraints, and complexity of power systems. The wide area measurement system (WAMS) with phasor measurement units (PMUs) provide key technologies for monitoring, state estimation, system protections and control of widely spread power systems. A direct, more precise and accurate monitoring can be achieved by the technique of phasor measurements and global positioning system (GPS) time signal. Proper grasp of the present state with flexible wide area control and smart operation address significant elements to maintain wide-area stability in the complicated grid with the growing penetration of distributed generation and renewable energy sources.

In response to the existing challenge of integrating advanced metering, computation, communication and control into appropriate levels of PSMC, this course provides a comprehensive coverage of WAPSMC understanding, analysis, and realization. It presents both theoretical knowledge and practical foundation for understanding of WAPSMC. Different aspects, current challenges and research directions will be examined in detail.

## Topics Covered

1. Introduction (Bevrani)
2. Power System Control (Golpira)
3. Automatic Generation Control and SCADA (Golpira)
4. PMU-based Oscillation Analysis I (Golpira)
5. DGs/Microgrids Impacts on Power System (Golpira)
6. PMU-based Oscillation Analysis II (Bevrani)
7. PMU-based Stability Assessment (Bevrani)
8. WAMS-based Power System Control (Bevrani)
9. Emergency Control (Bevrani)

## Grading

The course grade will be determined using the following:

- Homework and activities: 15%
- Presentation of a new work: 15%
- Final Exam: 35%
- Final Project: 35%

## References

- [1] H. Bevrani, M. Watanabe and Y. Mitani, *Power System Monitoring and Control*, IEEE-Wiley Press, 2014.
- [2] H. Bevrani, H. Golpira, *Course Lecture Notes*, Spring 2018.
- [3] Recent Publications of Instructors

## Homework Assignments

The homework assignments will be performed along the semester.

Note: Students may discuss the problems with other students, but are not allowed to share solutions (MATLAB m-files, etc.).

## Final Project

During the last 1/2 of this course you will work on a special project of your choice. This will give you a chance to deepen your knowledge in your area of interest. You will provide a detailed written report and simulation files.