

SEMESTER <i>Eighth</i>	DEPARTMENT <i>Control Engineering</i>	COURSE TITLE <i>SCADA</i>
COURSE CODE <i>EC807</i>	HOURS 3 UNITS 3	COURSE SPECIFICATIONS <i>Theoretical Content</i>
2. SCADA – Purpose, Elements, and Layout: 2and 3 together <ul style="list-style-type: none"> ➤ Purpose of a SCADA System. ➤ Applicable Processes. ➤ Elements of a SCADA System. ➤ SCADA Layout. ➤ A Limited Two-Way System. 		
3. Historical Development—Analog and Digital: <ul style="list-style-type: none"> ➤ Analog Signals, Measurement, and Control. ➤ Discrete Signals, Measurement, and Control. ➤ Development from Telemetry. ➤ Dependence on Communication and Computers. 		
4. Real-Time Systems: <ul style="list-style-type: none"> ➤ Is SCADA Real-Time? ➤ Continuous Process Control. ➤ Communications Access and “Master-Slave”. ➤ Determining Scan Interval. ➤ Where to Compute? 		
5. Control System Elements: Sensors, Actuators, and Algorithms: <ul style="list-style-type: none"> ➤ A Forgotten Cost. ➤ Special Considerations. ➤ Standardization. ➤ Maintenance. ➤ Local Controllers. ➤ Controllers in RTUs. (more details , local sensors , sleep) 		
6. Field/RTU Communications: (less details) <ul style="list-style-type: none"> ➤ Three Rules of Communication. ➤ Analog Pneumatic and Hydraulic Signals. ➤ Analog Electronic Controllers. ➤ Digital Electrical Communication. ➤ How Digital Works—Analog to Binary to Digital.(delete) ➤ Parallel or Serial? ➤ Communication Topology. ➤ Fieldbus and Similar Standards. 		
7. Remote Terminal Units—RTUs: (less details) <ul style="list-style-type: none"> ➤ What Does an RTU Do? ➤ Communications Interface. ➤ Protocol Detailed. ➤ Discrete Control. 		

- Analog Control.
- Pulse Control.
- Serial Control.
- Monitor Discrete Signals.
- Monitor Pulse Count Signals.
- Monitor Serial Signals.
- Non-RTU Functions.
- RTU Hardware Choices.

8. RTU/MTU Communication: *application in industry*

- Communications System Components.
- Protocol.
- Modems.
- Telephone Cable or Radio?
- Simplex or Duplex?
- Turn-On Time.
- Frequencies: Are They Available?
- Path Studies and Seasonal Variations.
- Solar Variations.
- Reliability and Maintenance.
- Satellite Communications.
- Cell Phones.
- Internet SCADA.

9. Master Terminal Units—MTUs:

- Communications Interface.
- Configuring a Picture of the Process.
- Some Simple Applications.
- Data Storage.

10. Operator Interface:

- Operator Interface on Very Small Systems.
- Operator Interface on Mid-sized Systems.
- Operator Interface on Large Systems.
- Local Security Considerations.
- Monitor Status Points.
- Monitoring Alarms.
- Totalized Values and Trending.
- Control Interfacing.
- Reports.
- Parallel Operator Interface.

11. Remote Control—What Not to SCADA: (??)

- Murphy's Law and Remote Control.
- Safety Instrumented Systems.
- Regulatory Requirements.

12. Security:

- What Is the Risk?
- Risk Evaluation Procedures.
- Risk Mitigation.
- Document and Follow-Up.

13. Applications:

- Real Time Revisited.
- Accounting and Quality of Data.
- Scanning and Communications.
- Automatic or Remote Control.
- Advisory Applications.

14. What's Next? *Delete*

- Communications Technology—Field Data.
- Communications Technology—RTU/MTU.
- Reductions in SCADA/Enterprise Communications.
- More Fully Automatic Applications.

15. SCADA Economics: *delete*

- Costs versus Benefits.
- The Time Value of Money.
- Capital Costs.
- Training and Maintenance Costs.
- SCADA Operating Costs.
- Benefits: Reduced Capital Costs.
- Benefits: Reduced Operating Costs.
- Benefits: Improved Facility Effectiveness.
- Tax Implications.

References:

1. *SCADA: Supervisory Control and Data Acquisition* by Stuart A. Boyer, 4th ed., 2010.