SYLLABUS

1. **Course name:** Data Acquisition System and SCADA
2. **Course code:** SCDA420946
3. **Credits:** 2 (2/0/4)
   Duration: 15 weeks (30h main course and 60h self-study)
4. **Instructors:**
   1- Truong Dinh Nhon, PhD
   2- Ngo Van Thuyen, PhD
   3- Quach Thanh Hai, PhD
   4- Ta Van Phuong, MEng
5. **Course conditions**
   Prerequisites: Digital systems, Electric Circuit
   Corequisites: Digital systems, Microprocessor.
6. **Course description**

This course provides students the knowledge of the structure, classification, and application of the data acquisition system and control. The processing and operating principle of the signal processing unit, the practical signal processing units and the programming technics to collect the data in real systems.

Besides, students are introduced the knowledge of the SCADA system and some specific software to design the SCADA system.

7. **Course Goals**

Goals	***Goal description*** *(This course provides students:)*	**ELOs**
G1	The structure of the data acquisition system for measurement and control systems	01 (H)
G2	The structure of OPC and the data exchange of the OPC	02 (M)
G3	An ability to design and program the SCADA for the industrial systems.	11 (H)
G4	An ability to use documents in English	06 (H)
G5	An ability to use methods in designing system using the SCADA	07 (M)

** Note: High: H; Medium: M; Low: L*

8. **Course Learning Outcomes (CLOs)**

CLOs		***Description*** *(After completing this course, students can have:)*	**Outcome**
G1	G1.1	The ability to analyse the structure and function of the basic units of the DAQ systems.	01 07
	G1.2	The ability to program for the DAQ systems.	11

G2	G2.1	The ability to analyse the structure of the OPC systems.	02
	G2.2	The ability to select the suitable OPC systems.	01 11
G3	G3.1	The ability to present the structure of the SCADA systems, the basic requirements of the SCADA systems.	01 02
	G3.2	The ability to select the suitable SCADA software of the industrial systems and program for the selected systems.	01 11
G4	G4.1	The ability to communicate in English and work effectively as a member and leader in teams.	06

9. Study materials

- Textbooks:

[1] *Data Acquisition and Control Handbook*, A guide to Hardware and Software for Computer-based Measurement and Control, Keithley.

- References:

[2] *Practical Data Accquisition for Instrumentation and Control System*, John Park and Steve Mackay, 2003.

10. Student Assessments

- Grading points: 10

- Planning for students assessment is followed:

Type	Contents	Linetime	Assessment techniques	CLOs	Rates (%)
Midterms					**50**
Exam01	The structure of the DAQ systems	Weeks 4	Individual paper assessment in class	G1.1, G2.1,	10
Exam02	Design of DAQ systems using microcontrollers	Week 8	Working in groups	G1.1, G1.2, G4.1	20
Exam03	Design of SCADA systems for the specific industrial requirements	Week 12	Working in groups	G3.1, G3.2, G4.1	20
Final exam					**50**
Final Exam	- The project covers all contents related to the expected learning outcomes of the course. - Students are required to design a specific SCADA system by themself.		Working in groups	G1.2, G2.1, G2.2, G3.1, G3.2, G4.1	

11. Course details:

Weeks	Contents	CLOs
1,2	***Chapter 1: <INTRODUCTION OF THE DAQ AND CONTROL***	

	SYSTEM *(4/0/8)*	
	A/* Contents and teaching methods: (4)* **Contents:** 1.1 Introduction to the DAQ and Control systems 1.2 Structure and function of the basic units of the DAQ and control system 1.3 Classification, selection and estimasation of the DAQ and control systems. **Teaching methods**: + Presentation + Group discussion	G1.1 G4.1
	***B/* Self-study contents**: *(8)* + The units of the real DAQ systems	G1.1
3,4,5	***Chapter 2:*** **< SIGNAL PROCESSING >** *(6/0/12)*	
	A/* Contents and teaching methods: (6)* **Contents:** 2.1 Sensors and processing units 2.2 ADC and DAC systems 2.3 The structure of the real DAQ systems 2.4 The SCADA software **Teaching methods**: + Theoretical lectures + Presentation + Group discussion	G1.1 G1.2 G4.1
	***B/* Self-study contents**: *(12)* + The factors that effective to the accuracy of the ADC and DAC systems + Exercises	G1.1 G1.2 G4.1
6,7	***Chapter 3:*** **< SCADA SYSTEMS >** *(4/0/8)*	
	A/* Contents and teaching methods:(4)* **Contents:** 3.1 Introduction to SCADA systems 3.2 The structure of the SCADA systems 3.3 Some basic SCADA systems **Teaching methods**: + Theoretical lectures + Group discussion + Questions	G3.1 G3.2 G4.1
	***B/* Self- study contents**: *(8)* + Find some real SCADA systems on the internet + List some basic specifications of these SCADA systems	G3.1 G3.2 G4.1
8,9,10	***Chapter 4:*** **< DAQ SOFTWARE >** *(6/0/12)*	

	A/* Contents and teaching methods: (6)* **Contents:** 4.1 Specifications of the DAQ software 4.3 Introduction to OPC 4.3 Specifications of the OPC Server 4.4 Some OPC using in industry: Rslinx, KeepServer, I/O Server, SimaticNet, OPC Link, Factory Suite Gateway. **Teaching methods**: + Theoretical lectures + Group discussion + Group project	G1.1 G3.1 G3.2 G4.1
	***B/* Self- study contents**: *(12)* + Data transfer between PLC and SCADA systems + Expansion inputs/outputs for multiplexers and demultiplexers. + Exercises	G3.2 G4.1
11,12,13,14,15	***Chapter 5:* < DESIGN SCADA SYSTEMS > *(10/0/20)***	
	A/* Contents and teaching methods: (10)* **Contents:** 5.1 Some requirements for designing SCADA systems 5.2 Step for designing SCADA systems 5.3 Designing SCADA systems using WinCC, Factory Talk, Intouch, Labview software **Teaching methods**: + Theoretical lectures + Demo for students + Group discussion	G1.2 G2.1 G2.2 G3.2 G4.1
	***B/* Self- study contents**: *(20)* + Exercises + Design SCADA systems for the specific requirements from industry	G2.2 G3.2 G4.1

12. Learning ethics:

- Home assignments and projects must be done by the students themselves. Plagiarism found in the assessments will get zero point for midterm and final scores

13. First approved date: August 01 2012

14. Approval level:

Dean	Department	Instructor
Nguyen Minh Tam, PhD	**Nguyen Thanh Hai, PhD**	**Truong Dinh Nhon, PhD**

15. Syllabus updated process

1st time: Updated content dated **2st time:** Updated content dated	Instructors Head of department