NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE TEMPLATE			
Course Title	Instrumentation and Control in Energy Systems		
Course Code	EN631	**No. of Credits**	3
Department	DEE	**Faculty**	Dr.C.Naveen/Mr.Ramesh R
Pre-requisites Course Code	Fundamental Class 12- Physics		
Course Coordinator(s) (if, applicable)			
Other Course Teacher(s)/Tutor(s) E-mail		**Telephone No.**	9489247841
Course Type	☐ Core course	☑ Elective course	

COURSE OVERVIEW

The course deals with instruementation useful in temperature, flow measurements and minimizing errors. It also defines the role of control system in practical energy measurements.

COURSE OBJECTIVES

1. To learn the principle and technical concepts of various transducers in instrumentation and error analysis
2. To understand the temperature, pressure and flow measuring devices
3. To apply the knowledge of elements in control systems for practical energy measurements

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
1. To analyze measurement errors from the outcomes of various instruments and to differentiate various transducers useful in Instrumentation systems 2. To identify and interpret different temperature measuring devices.	1,2,3,4,5,8

3. To distinguish flow measurement devices used in control systems. 4. To identify different elements in a control system. 5. To apply control systems for practical energy measurements.	

COURSE TEACHING AND LEARNING ACTIVITIES

S.No	Week	Topic	Mode of Delivery
1	Week 1	Introduction to the course	Chalk
2	Week 1	Error Analysis -1	Chalk
3	Week 1	Error Analysis -2	PPT
4	Week 2	Problems in error analysis	Chalk
5	Week 2	Transducers - 1	Chalk
6	Week 2	Transducers - 2	PPT
7	Week 3	Transducers - 3	PPT
8	Week 3	Introduction to temperature measurement	Chalk
9	Week 3	Principle of thermometry	Chalk
10	Week 3	Thermometers -classification	Chalk
11	Week 4	Ideal gas law and problems	Chalk
12	Week 4	Thermocouple - 1	Chalk
13	Week 4	Thermocouple - 2	PPT
14	Week 5	Problems in thermocouple	Chalk
15	Week 5	Thermistors	PPT
16	Week 5	Pyrometry	PPT
17	Week 5	Calibration of Pressure measuring equipment	PPT
18		Test I	
19	Week 6	Moving coil, PMMC working	PPT
20	Week 6	Problems in voltmeter, ammeter and potentiometer	Chalk

21	Week 6	Energy meter, single phase, three phase - Problems	Chalk
22	Week 7	Power factor meters, single phase, three phase - Problems	Chalk
23	Week 7	Op-amp, differentiator, inverting & non inverting amplifier	PPT
24	Week 7	Instrumentation amplifier, temperature controller	Chalk
25	Week 8	Analog to digital converters	PPT
26	Week 8	Digital to analog converters	PPT
27	Week 8	Data processing and display	Chalk
28	Week 9	Control system	PPT
29	Week 9	Computer data processing and control	PPT
30	Week 9	Feed forward and feedback control system	PPT
31		Test II	
32	Week 10	Stability, time transient analysis	Chalk
33	Week 10	Frequency transient analysis	Chalk
34	Week 10	PID controllers - 1	Chalk
35	Week 11	PID controllers - 2	Chalk
36	Week 11	Applications of PID controllers	PPT
37	Week 11	Review of control systems	Chalk
38	Week 12	Flow measurement	Chalk
39	Week 12	Different types of flow measuring devices	PPT
40	Week 12	Hot wire anemometers, Hot film transducers	PPT

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	I cycle test	6th week since commencement	1 hour	15
2	Assignment	6 -9th week		10

3	II cycle test	10th week since commencement	1 hour	15
4	Analysis& Design Test	End of 12th week	1 hour	20
5.	End semester examination	At the end of Course	2 hours	40

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

(a) Required text:
W.F. Stoecker: "Design of Thermal Systems", 3rd Ed., McGraw Hill,1989.
B.K.Hodge: "Analysis and Design of Thermal Systems", Prentice Hall Inc., 1990.
(b) Reference books
J. Nagrath& M .Gopal: "Systems Modelling and Analysis", Tata McGraw Hill.
D.J. Wide: "Globally Optimal Design", Wiley- Interscience, 1978

COURSE EXIT SURVEY

Feedback through google docs at regular intervals(4TH, 8TH and 12THweeks)

COURSE POLICY

Use of mobile phones is strictly prohibited inside class room/exam room.
Late coming for theory classes leads to "ABSENT" in attendance.
75% attendance is mandatory for appearing in end semester exam.
Late submission of assignment will not be accepted.
Prior permission is required from HoD to avail ON-DUTY.
All other disciplinary actions as per NITT rules& regulations.

ADDITIONAL COURSE INFORMATION

Queries may also be emailed to the Course Coordinator directly at **naveen@nitt.edu**

FOR SENATE'S CONSIDERATION

C.Naveen
Course Faculty Ramesh.R CC-Chairperson N.A.A.A. M.Ramesh HOD