ILLINOIS VALLEY COMMUNITY COLLEGE

Course Outline

DIVISION: Career and Technical Programs

Course: ELT 2207– Instruments and Measurements

Date: November 7, 2008

Semester Hours: 1

Prerequisite(s):

Delivery Method:	☒ **Lecture**	**.5 Credit Hours**
	☐ **Seminar**	**0 Credit Hours**
	☒ **Lab**	**1 Credit Hours**
	☐ **Clinical**	**0 Credit Hours**
	☐ **Online**	
	☐ **Blended**	

Offered: ☒ **Fall** ☐ **Spring** ☐ **Summer**

IAI Equivalent –***Only for Transfer Courses***-go to *http://www.itransfer.org*:

CATALOG DESCRIPTION:
A study of circuits used in electronic measure¬ments; applications and theory of the circuits used in test instruments; capabilities and limita¬tions of test instruments; and loading effects of the instruments.

GENERAL EDUCATION GOALS ADDRESSED

[See the last page of this form for more information.]

Upon completion of the course, the student will be able:

[Choose those goals that apply to this course.]

☒ To apply analytical and problem solving skills to personal, social and professional issues and situations.
☒ To communicate orally and in writing, socially and interpersonally.
☐ To develop an awareness of the contributions made to civilization by the diverse cultures of the world.
☒ To understand and use contemporary technology effectively and to understand its impact on the individual and society.
☒ To work and study effectively both individually and in collaboration with others.
☐ To understand what it means to act ethically and responsibly as an individual in one's career and as a member of society.
☐ To develop and maintain a healthy lifestyle physically, mentally, and spiritually.
☒ To appreciate the ongoing values of learning, self-improvement, and career planning.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals.]

Upon completion of the course, the student will be able to:

1. Explain and utilize measurement theory and errors
   - Competency 1.1 Explain the correct way to connect a Volt meter
   - Competency 1.2 Explain the correct way to connect an Amp meter
   - Competency 1.3 Explain the effects of metering on a circuit.
   - Competency 1.4 Calculate the loading effect and error of a meter.
2. Demonstrate the correct use of a Digital VOM
   - Competency 2.1 Correctly setup and measure Ohms.
   - Competency 2.2 Correctly setup and measure Volts.
   - Competency 2.3 Correctly setup and measure Amps.
3. Demonstrate the correct use of an Analog VOM.
   - Competency 3.1 Correctly setup and measure Ohms.
   - Competency 3.2 Correctly setup and measure Volts.
   - Competency 3.3 Correctly setup and measure Amps.
4. Explain and utilize a variety of Signal Sources
   - Competency 4.1 Correctly setup a DC power supply.
   - Competency 4.2 Correctly setup an AC power supply.
   - Competency 4.3 Correctly setup a Function Generator.
   - Competency 4.4 Correctly setup a Pulse Generator.
   - Competency 4.5 Explain imperfections in each power source.
5. Explain Oscilloscope limits and uses
   - Competency 5.1 Explain cycle time and how to calculate it
   - Competency 5.2 Explain frequency and how to calculate it.

Competency 5.3 Explain voltages and how to calculate it.
Competency 5.4 Calculate setting for a given signal.

6. Demonstrate the correct use of an Oscilloscope
   Competency 6.1 Correctly setup leads on a circuit.
   Competency 6.2 Correctly measure Voltage.
   Competency 6.3 Correctly measure Frequency.
   Competency 6.4 Correctly measure lead and Lag time and calculate phase angle.
7. Demonstrate the correct use of a Frequency counter
   Competency 7.1 Correctly setup and measure Frequency.
8. Demonstrate the correct use of a Logic Probe
   Competency 8.1 Correctly setup and measure a TTL circuit.
   Competency 8.2 Correctly setup and measure a CMOS circuit.
9. Utilize beginning workplace skills
   Competency 9.1 Use effective oral communication skill with small group interaction.
   Competency 9.2 Explain employer expectations.
   Competency 9.3 Apply teamwork skills while participating in small and large group activities.
   Competency 9.5 Apply basic math skills to projects appropriate to coursework.

COURSE TOPICS AND CONTENT REQUIREMENTS:

I. Lab Safety
1. Room safety
2. Equipment safety
3. Personal safety
II. Polarity
1. Positive
2. Negative
3. Grounding
III. Digital VOM
1. Ohm Meter
2. Volt Meter
3. Amp meter
IV. Analog VOM
1. Ohm meter
2. Volt Meter
3. Amp Meter
V. Metering Effects
1. Meter Error
2. Loading Effects
3. Loading effect error
4. Quality and acceptability
VI. Signal sources

1. DC sources
2. AC sources
3. Function Generators
4. Pulse Generators

VII. Oscilloscopes

1. Probes
2. Triggers
3. Voltage Settings
4. Time base settings
5. Channel settings

VIII. Oscilloscope Measurements

1. Cycle time
2. Frequency
3. Voltages, Vpp, Vp Vrms, Vave
4. Degrees
5. Phase angles

IX. Special Meters

1. Logic probes
2. Frequency counters
3. Meg-O-Meters

X. Work Place Skills

1. Teamwork
2. Employer Expectations

INSTRUCTIONAL METHODS:

Lecture
Lecture/demonstration
Laboratory
Think Tank Modules
Group work

INSTRUCTIONAL MATERIALS:

Equipment Owners Manuals
Think Tank Modules

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

Required assignments:	Methods of Evaluation:
Mandatory lab attendance	A students' grade will be based on multiple measures of performance:
Weekly lab assignments	
Short quizzes	
Assigned reading	Completion of lab assignments

Assigned homework	Quizzes based on lab and text assignments
Midterm exams	Group projects
Lab practical exam	Completion of homework assignments
Final exam	Midterm, final, and lab final exams

90% - 100%	A
80% - 89.9%	B
70% - 79.9%	C
60% - 69.9%	D
below 60%	F

Lab	30%
Quizzes and Tests	40%
Midterm and Final	30%

OTHER REFERENCES

Schaum's Outlines: Basic Mathematics for Electricity and electronics. 2nd edition. Authur Beiser

Form Revised: 3/2/05