CASPER COLLEGE COURSE SYLLABUS  
ELTR-2870. 01 ELECTRONIC IMAGING TECHNIQUES

Semester/Year: Fall 2006

Lecture Hours: 3  
Lab Hours: 3  
Credit Hours: 4.5

Class Time: 9-9:50 AM  
Lab: 9-11:50 AM  
Days: MTF  
Room: EI 124

Instructor’s Name: Dave Arndt

Instructor's Contact Information:  
Office Phone #: 268-2521  
Office: EI 121  
Email: darndt@caspercollege.edu  
Office hours: M,T,W,TH, & F: 8-8:50 AM

Course Description  
The creation of images by electronic means will be discussed. This standard NTSC raster scanning system used in broadcast television will be investigated at both the sending and receiving ends. The second half of the course will extend the investigation to cover the generation of both alphanumeric and graphic images on modern microcomputer systems.

Statement of prerequisites: ELTR-1570 OR PERMISSION OF INSTRUCTOR

Goal:  
Upon completion of this course, the student will:

1. Understand the basic techniques used to transmit and receive sound, luminance and chrominance information in the NTSC television system.
2. Understand the functions of the stages within a typical super heterodyne color TV used to receive these signals.
3. Understand the functions of the stages within a typical computer RGB video monitor.
4. Understand the functions of the stages in a video interface card used to create the video display within a typical IBM type PC.

Outcomes:  
The student will:

1. Observe and measure the signal flow in a typical NTSC color TV.
2. Adjust the picture and sound qualities in a typical NTSC TV for optimum performance.
3. Observe and measure the signal flow in a typical RGB computer video monitor.

4. Adjust the picture qualities in a typical RGB computer video monitor for optimum performance.

Methodology:
See attachment.

Evaluation criteria:
See attachment.

Required Text, Readings, and Materials:
*Basic Television & Video Systems*: GROB
Various handouts

Class Policies: Last Date to Change to Audit Status or to Withdraw with a W
Grade: Standard college policy.

Student Rights and Responsibilities: Please refer to the Casper College Student Conduct and Judicial Code for information concerning your rights and responsibilities as a Casper College Student.

Chain of Command: If you have any problems with this class, you should first contact the instructor in order to solve the problem. If you are not satisfied with the solution offered by the instructor, you should then take your problem through the appropriate chain of command starting with the department head, then the division chair, and lastly the vice president for academic affairs.

Academic Dishonesty - Cheating & Plagiarism: Casper College demands intellectual honesty. Proven plagiarism or any form of dishonesty associated with the academic process can result in the offender failing the course in which the offense was committed or expulsion from school. See the Casper College Student Code of Conduct.

ADA Accommodations Policy: It is the policy of Casper College to provide appropriate accommodations to any student with a documented disability. If you have a need for accommodation in this course, please make an appointment to see me at your earliest convenience.

SAFETY: Personal and equipment safety standards will be strictly enforced. It is the individual’s responsibility to develop a safe work attitude.

Calendar or schedule indicating course content:
See attachment.
ELECTRONICS 2870 GRADING GUIDELINES:

TOTAL VALUE

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Semester average = Grand total / 5

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ELTR-2870 Course Outline

Unit-1 Introduction to Broadcast Television
Introduction to TV broadcasting.
The NTSC TV channel.
Video and audio signals.
The North American TV spectrum.

Unit-2 The television picture.
Picture elements.
Horizontal and vertical scanning.
Frame and field frequencies.
H and V scanning frequencies.
The 3.58 MHZ Color signal.
The 6 MHZ TV broadcast channel.

Unit-3 Scanning and Synchronization.
Sawtooth waveform for linear scanning.
Interlaced scanning pattern.
Synchronizing pulses.
Scanning, synchronizing and blanking frequencies.

Unit-4 Television Cameras.
Basic operation of a TV camera.
Types of camera tubes.
The solid state CCD sensor.
Optical separation of Red, Green and Blue.
Unit-5 Picture Tubes.
Picture tube construction.
Screen phosphors.
Electron gun.
Electrostatic focus.
Tricolor picture tubes.

Unit-6 Video signal Analysis.
Composite video signal.
H and V blanking.
Video signal frequencies.
Oscilloscope waveforms.
Maximum number of picture elements.

Unit-7 The monochrome television receiver.
Functional block diagram.
RF amp.
Local oscillator.
Mixer.
IF amp.
Video detection and amp.
Sound detection and amp.
Raster circuits.

Unit-8 The Color Television system.
Color vision.
Producing the Y and C signals.
Color television circuits.
Decoding the R-Y,G-Y and B-Y signals.
NTSC color limitations.

Unit-9 The CRT video monitor.
NTSC monitors.
Computer compatible monitors.
MDA monitors.
CGA monitors.
EGA monitors.
VGA monitors.
Multisynch monitors.

Unit-10 The video display system.
Video RAM.
Attribute memory.
System timing.
Character Generator.
Cursor and update signals.
Unit-11 A simple video interface card.
The IBM monochrome display adapter.
CRTC control of system timing.
VRAM organization.

Unit-12 Intro to Computer Graphics Displays.
Calligraphic display advantages & disadvantages.
Raster scan advantages and disadvantages.
VRAM requirements of displays of different resolutions.

Unit-13 A generic graphics display card.

Unit-14 Hardcopy Graphics.
Pen plotters.
Electrostatic plotters.
Impact dot-matrix printers.
Thermal ink jet printers.
LaserJet type printers.

Unit-15 CRT controllers.
Functions of a CRTC.
The Motorola 6845 CRTC, a hardware view.
Programming the 6845 CRTC.

Unit-16 IBM PC Video Cards.
MDA video cards.
CGA video cards.
Hercules video cards.
EGA video cards.
VGA video cards.
Super VGA video cards.
The future, hardware assisted video and dedicated video microprocessors.

Unit-17 Electronic Photography
The creation of an electronic photo
Electronic camera operation
Electronic image storage
The JPEG, TIF and BMP storage formats
MPEG video storage