COURSE MANAGEMENT PLAN

Course Title: Electronics Technology

Teacher: Mr. Duda

Room Number: 114

Grade Level: Junior

TEXTBOOK:

N/A

COURSE BENEFITS:

Students will acquire a solid understanding of analog circuits, digital circuits, schematics, and various engineering/electronic software packages. Course topics will be taught using several methods including breadboard lab exercises, robotics, and individual design projects. Students will be exposed to the components that are used in microprocessors and microcontrollers. Software programming will help to integrate code writing with hardware design.

A strong emphasis will be placed on the correct use of electronic measuring equipment and computer software. All lab experiments will require documentation in either technical memorandum format or lab report format. It will be required that all work submitted is typed using Microsoft Word. All tables and graphs will be developed using Microsoft Excel. Several programs will be available for the drawing and designing of schematics. Computational software packages will be used to emphasize and help in the understanding of important concepts.

COURSE OUTLINE (BY MONTH):

Covered Monthly:

- Demonstrate proper safety practices
- Properly use tools and test equipment
- Maintain daily log in engineering style logbook
- Properly assemble electronic circuits
- Relate theory to practice on all lab exercises
- Accurately perform electrical/electronic calculations
- Use lab reports and memorandums to effectively present projects
- Demonstrate proficient skills in problem solving, diagnostics, and troubleshooting
- Apply the engineering design process to solution based projects

Robotics:

Robotics will be used throughout the year as a tool to emphasize topics outlined in the Vocational Technical Frameworks. Robotics focuses on topics including:

- The engineering design process
- Technical logbook writing
- Microprocessors and microcontrollers
- Digital logic
- Analog circuits and sensors
- Ultrasonic sensors
- Optical shaft encoders
- Photocells
- Computer programming
- Serial to USB interfacing

September:
Select and use discrete Semiconductor instruments.
- Test diodes with multimeters.
- Test transistors.
- Test thyristors.

Apply electronic principles to discrete semiconductor devices.
- Explain manufacturers' specifications of semiconductor devices.
- Explain characteristics of discrete semiconductors.
- Explain biasing of discrete semiconductors devices.

Perform calculations of discrete semiconductor devices.
- Calculate and plot voltage current characteristics of diode types.
- Calculate and plot voltage current characteristics through transistor types.
- Determine and plot voltage current characteristics through thyristor types.

October:
Use digital instruments.
- Use logic probes/pulser and multimeter.
- Demonstrate the use of a multi-channel oscilloscope and logic analyzer.
- Use a signal generator.

Verify discrete semiconductor devices.
- Measure and explain current voltage characteristics of diode types.
- Measure and explain current voltage characteristics of transistor types.
- Measure and explain current voltage characteristics of thyristor types.
- Introduce thermal management of discrete semiconductor devices.

Apply electronic principles of semiconductor circuits.
- Identify transistor configurations.
- Identify and list types of transistor biasing configurations.
- Identify rectifier diodes circuits.
- Identify regulator diodes circuits.
- Analyze power supply circuits.

- Analyze a thyristor circuit.
- Identify a typical switching type power supply.

November:
Perform calculations for Semiconductor Circuits.
- Analyze DC operating point of transistor amplifiers.
- Calculate signal gain of transistor amplifiers.
- Analyze DC operation point of oscillator circuits.
- Calculate frequency of oscillator circuits.

Verify semiconductor circuits.
- Construct and explain rectifier diode circuits.
- Construct and explain regulator diode circuits.
- Construct and explain power supplies.
- Construct and explain a thyristor circuit.
- Construct and explain DC characteristics of transistor amplifiers.
- Construct and explain AC characteristics of transistor amplifiers.
- Construct and explain oscillator circuits.

December:
Apply electronic principles of Op Amps.
- List the characteristics associated with Op Amps.
- Identify and list operation parameters of operational amplifiers.
- Identify a differential amplifier circuit.
- Identify a comparator amplifier circuit including hysteresis.
- Identify inverting vs. non-inverting amplifiers.
- Identify summing amp.
- Identify active differentiator and integrator.
- Identify active filters.
- Identify voltage follower.
- Identify op amp oscillator circuits.

December/January
Perform calculations of Op Amp devices.
- Calculate the gain of inverting and non inverting op amp circuits.
- Calculate gain for a differential amplifier circuit.
- Calculate the switching voltage of a comparator circuit.
- Calculate the switching voltage of a comparator circuit including hysteresis.
- Calculate the output voltage of a summing amp.
- Calculate the output voltage of a differentiator.
- Calculate the output voltage of an integrator.
- Calculate cutoff frequencies of active filters.
- Calculate the frequency of oscillators.

February:
Verify operational amplifiers.

- Construct, simulate, and explain the gain of inverting and non-inverting op amp circuits.
- Measure and explain gain for a differential amplifier circuit.
- Measure and explain the switching voltage of a comparator circuit.
- Measure and explain the switching voltage of a comparator circuit including hysteresis.
- Measure and explain the output voltage of a summing amp.
- Measure and explain the slope of a differentiator.
- Measure and explain area of an integrator.
- Measure and explain cutoff frequencies of active filters.
- Measure and explain frequency of oscillators.

March:
Apply electronic principles of digital circuits.

- Identify high and low and tri-state characteristics of a digital signal.
- Identify basic TTL gates of the 7400 series and explain IO characteristics.
- Identify pin numbers and manufacturer markings on digital IC's.
- Identify differences between TTL and CMOS logic families.
- Identify and calculate parity bits for error control.
- Identify the universal properties of nand and nor gates.
- Identify alternate schematic forms of basic logic gates.

April:
Apply electronic principles of digital circuits.

- Identify various combinational and sequential logic circuits.
- Identify reduction theorems used to simplify digital electronic circuits.
- Identify the basic architecture of a microprocessor or microcontroller.
- Demonstrate an understanding of PLA devices.
- Demonstrate an understanding of line driver characteristics and applications of its uses.
- Identify a digital oscillator circuit including the 555.
- Identify circuits that perform A/D and D/A conversions.

May/June:
Perform calculations and applications of digital devices.

- Use the two’s complement number system for math operations.
- Convert between binary, decimal and hexadecimal numbers.
- Identify and use alternate digital codes.
- Draw logic diagrams from Boolean expressions.
- Write truth table from a Boolean expression or logic circuit.
- Use reduction theorems to simplify digital electronic circuits.
- Develop waveforms for latches/flip-flops.
- Develop counter circuits waveforms.

REQUIRED STUDENT MATERIALS:

Students are required to have an up to date binder of all coursework and handouts. Binders will be checked weekly for completeness. It is also required that students accurately maintain a daily technical logbook. The logbook will be critiqued for accuracy and completeness at least twice a week. It is recommended that each student have there own hand tools for lab exercises.

GRADING POLICY:

- Daily Grade 30%
- Practice and Experiment (lab assignments) 30%
- Quiz / Test / Logbooks 20%
- Lab Reports and Memorandums 20%

Breakdown of grading structure:

Daily grade:

Staying on Task	30%
Attendance	10%
Safety / Horseplay	10%
Interaction with Peers	10%
Interaction with Staff	10%
Behavior / Profanity	10%
Questions / Interest	10%
Cleanup	10%

Practice and experiment:

Completion	50%
Applying Theory	20%
Following Directions	20%
Results	10%

Quizzes and tests:

Correct or incorrect answers (minimal partial credit given)	100%
Logbooks	A - F

Lab reports and technical memorandums:

Technical content and Completeness of report	60%
English and grammar	15%
Tables / Graphs	15%
Supporting documentation	10%

A mid-term and final exam will be given in accordance with school policy.

PERMISSION TO LEAVE CLASS:
Written permission (agenda book signature) must be obtained from one of the three shop instructors to leave the classroom.

EXTRA HELP:
Extra help will be offered every day that school is in session from 2:09p.m. - ?. An appointment is required.

MAKE-UP GUIDELINES:
Some assignments will not be allowed make-ups. When a make-up is allowed the second grade will be averaged with the first grade.
Example:
The first grade received on a homework assignment is 50%
The make-up score was 100%
The student's grade after the make-up will be a 75% for that assignment.

EXTRA CREDIT:
It is very rare that extra credit will be given. If an extreme circumstance requires extra credit it will be constituted on an individual basis and based on the particular situations circumstances.

CLASSROOM EXPECTATIONS:
It is expected that every student is present and punctual every day. The daily rules such as profanity, dress code, etc. will be instituted exactly as they are outlined in the student handbook.

Failure to follow any rules stated in these expectations or in the student handbook will result in disciplinary action appropriate to the violation of such rule.

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Please sign and return this form acknowledging that you have read and understand the above information in regard to the (class_____) course management plan. If you have any questions or concerns please contact me at the school.

Thank you for your cooperation.
Teacher_____

Student signature and date_____

Parent/Legal Guardian signature and
date_____

9-5-07