

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

MICROCOMPUTER SYSTEMS II
COURSE OUTLINE

COURSE TITLE: MICROCOMPUTER SYSTEMS II

CODE NO.: CET 226-5

PROGRAM: COMPUTER ENGINEERING TECHNOLOGY

SEMESTER: FOUR

DATE: AUGUST 15, 1988

TEACHING MASTER: PETER SAVICH

APPROVED:

NEW
P. Savich
CHAIRPERSON

REVISION
88/09/00
DATE

MICROCOMPUTER SYSTEMS II

COURSE OUTLINE

PHILOSOPHY / GOALS

THE OBJECTIVE OF THIS COURSE IS FOR THE STUDENT TO DEVELOP A THOROUGH KNOWLEDGE OF THE UNIVERSALLY ACCEPTED MICROCOMPUTER SYSTEM, THE IBM PC. THIS UNDERSTANDING WILL BE DEVELOPED THROUGH THE USE OF THE "MICROSOFT ASSEMBLER" TO WRITE AND TEST MACHINE LANGUAGE PROGRAMS FOR THE IBM PC. THE USE OF DOS AND BIOS SERVICES, AND THE PROGRAMMING OF THE STANDARD SYSTEM PERIPHERALS WILL PROVIDE THE STUDENT WITH THE ABILITY TO DEVELOP SYSTEMS PROGRAMS, AND TO DEAL WITH PERIPHERALS AT THE MACHINE LANGUAGE LEVEL. THE MICRO-APPLICATIONS TRAINER (MAT) WILL BE USED IN THE LAB SETTING TO PROVIDE THE STUDENT WITH THE SMALL COMPUTER HARDWARE SUBSECTIONS THAT WHEN PATCHED TOGETHER WILL CREATE LARGER SYSTEM FUNCTIONS THAT WILL INCLUDE EXTERNAL DEVICES SUCH AS MOTORS, SENSORS, LAMPS, ETC. IN A SENTENCE, THE ULTIMATE GOAL OF THIS COURSE IS TO PROVIDE AN ENVIRONMENT THAT ALLOWS THE PRACTICAL EXPERIENCE OF PROGRAMMING IN ASSEMBLY LANGUAGE USING THE IBM PC COMPUTERS FOR THE CONTROL OF SOME REPRESENTATIVE SYSTEM CONFIGURATIONS THAT WOULD BE REQUIRED TO BE MAINTAINED OR INSTALLED IN INDUSTRY BY THE GRADUATING TECHNOLOGIST.

REVISION

NEW

28/01/82
DATE

[Signature]
CHAIRPERSON

APPROVED

COURSE GRADING SCHEME

METHOD OF ASSESSMENT

90+	A+
80 - 89	A
70 - 79	B
60 - 69	C

1.

THE STUDENT WILL BE ASSESSED THROUGH A SERIES OF THREE (3) WRITTEN TESTS. THEY WILL EACH BE WEIGHTED TO 20% OF THE FINAL MARK.

THE TENTATIVE DATES ARE: OCT 5 /88
NOV 3 /88
DEC 19/88

THESE TEST DATES WILL BE RE-ANNOUNCED ABOUT ONE WEEK IN ADVANCE.

2.

THE STUDENT WILL BE ASSESSED THROUGH A SERIES OF UNANNOUNCED QUIZES. THE TOTAL WEIGHT OF THESE QUIZES ARE NOT TO EXCEED 10% OF THE FINAL MARK.

3.

THE STUDENT WILL BE ASSESSED THROUGH A SERIES OF LAB ASSIGNMENTS. COLLECTIVELY THESE ASSIGNMENTS WILL BE WEIGHTED TO 25% OF THE FINAL MARK.

4.

THE STUDENT WILL BE ASSESSED ON THEIR ABILITY TO ANSWER QUESTIONS ABOUT THE LAB ASSIGNMENT ONCE SUBMITTED. THE STUDENT'S RESPONSE TO THESE LAB DEMONSTRATION QUESTIONS WILL BECOME PART OF THEIR "PRACTICAL DEMONSTRATION" MARK. THIS MARK WILL BE WEIGHTED TO 5% OF THE FINAL MARK.

5.

THE STUDENT ATTENDING MORE THAN 80% OF THE TIME WILL RECEIVE A BONUS OF 2%.

SUMMARY OF FINAL MARK

1.	TESTS	60%
2.	QUIZES	10%
3.	ASSIGNMENTS	25%
4.	DEMOS	5%
5.	ATTENDANCE	2% BONUS ONLY

100%

COURSE GRADING SCHEME

A+	90+	OUTSTANDING ACHEIVEMENT
A	80 - 89	ABOVE AVERAGE ACHEIVEMENT
B	70 - 79	AVERAGE ACHEIVEMENT
C	55 - 69	SATISFACTORY ACHEIVEMENT
U		UNSATISFACTORY GIVEN AT MIDTERM ONLY
S		SATISFACTORY GIVEN AT MIDTERM ONLY
R		REPEAT
X		A TEMPORARY GRADE THAT IS LIMITED TO INSTANCES WHERE SPECIAL CIRCUMSTANCES HAVE PREVENTED THE STUDENT FROM COMPLETING OBJECTIVES BY THE END OF THE SEMESTER. AN "X" GRADE MUST HAVE THE CHAIRPERSON'S APPROVAL AND HAS A MAXIMUM TIME LIMIT OF 120 DAYS.

3. UPGRADING OF INCOMPLETES

WHEN A STUDENT'S COURSE WORK IS INCOMPLETE OR FINAL GRADE IS BELOW 55%, THERE IS THE POSSIBILITY OF UPGRADING TO A PASS WHEN THE STUDENT'S PERFORMANCE WARRANTS IT. ATTENDANCE AND ASSIGNMENT COMPLETION WILL HAVE A BEARING ON WHETHER UPGRADING WILL BE ALLOWED. A FAILING GRADE ON ALL TESTS WILL REMOVE THE OPTION OF ANY UPGRADING AND AN "R" GRADE WILL RESULT. THE HIGHEST ON A RE-WRITTEN TEST OR ASSIGNMENT WILL BE 56%.

THE METHOD OF UPGRADING IS AT THE DISCRETION OF THE TEACHER AND MAY CONSIST OF ONE OR MORE OF THE FOLLOWING OPTIONS:

- ASSIGNED MAKE-UP WORK
- RE-DOING PROJECTS
- RE-DOING OF TESTS
- WRITTING OF COMPREHENSIVE SUPPLEMENTAL EXAMINATION

COURSE OUTLINE

* NOTE: THIS SET OF OBJECTIVES MAY REQUIRE SOME MODIFICATIONS AS THE SEMESTER PROGRESSES SINCE THIS COURSE OFFERING HAS MANY NEW BLOCKS AND RECENTLY ACQUIRED EQUIPMENT. ANY REVISIONS TO THE OBJECTIVES WILL BE ISSUED BEFORE TESTS OCCUR.

BLOCK I PC ARCHITECTURE AND ASSEMBLY LANGUAGE PROGRAMMING

THE STUDENT WILL FIRST REVIEW THEIR UNDERSTANDING OF ASSEMBLY BASED LANGUAGES BY COMPLETING A TUTORIAL PACKAGE WHICH CONTAINS SIX REPRESENTATIVE PROBLEMS WHICH ARE SOLVED USING THREE DIFFERENT ASSEMBLY LANGUAGES. THE STUDENT HAS TAKEN 8088 ASSEMBLY IN THE CET228 "MICROPROCESSOR CIRCUITS AND APPLICATIONS"; MACRO-11 ASSEMBLY IN THE CET200 "COMPUTER SYSTEMS"; AND 6800 ASSEMBLY IN THE CET120 "MICROPROCESSOR PROGRAMMING". THE EMPHASIS IN THIS BLOCK WILL BE TO WRITE COMPLETE 8088 ASSEMBLY LANGUAGE PROGRAMS THAT REQUIRE BIOS AND DOS INTERRUPTS. SPECIFICALLY, THE STUDENT WILL:

1. BE ABLE TO WRITE PROGRAMS USING INTERRUPTS TO CLEAR THE SCREEN, SET THE CURSOR, SET ATTRIBUTES FOR VIDEO DISPLAY, AND INPUT ASCII CHARACTERS VIA THE KEYBOARD AND OUTPUT TO THE CONSOLE SCREEN ASCII CHARACTERS.
2. BE ABLE TO USE EDITORS AVAILABLE TO SPEEDILY WRITE SOURCE CODE FOR ASSEMBLY.
3. BE ABLE TO USE THE DEBUG TOOLS TO ASSEMBLE AND UNASSEMBLE CODE
4. BE ABLE TO WRITE PROGRAMS THAT REQUIRE THE USE OF THE ARITHMETIC INSTRUCTIONS AVAILABLE FOR THE 8088. THE STUDENT SHOULD BE ABLE TO EXPLAIN HOW THE ADD, SUB, MUL, DIV, IMUL, AND IDIV INSTRUCTIONS WORK.
5. BE ABLE TO WRITE PROGRAMS THAT REQUIRE THE USE OF THE STRING MANIPULATION INSTRUCTIONS. THE STUDENT SHOULD BE ABLE TO EXPLAIN HOW THE MOVS, LODS, AND CMPS INSTRUCTIONS WORK.

ANTICIPATED LENGTH OF BLOCK: FOUR WEEKS

BLOCK II ADVANCED ASSEMBLY PROGRAMMING

THE STUDENT WILL REVIEW FILE HANDLING CONCEPTS DISCUSSED IN CET100 "BASIC PROGRAMMING" BUT THIS TIME USING THE 8088 ASSEMBLY LANGUAGE. TABLE SEARCHING CONCEPTS WILL ALSO BE DISCUSSED. SPECIFICALLY, THE STUDENT WILL:

1. BE ABLE TO WRITE PROGRAMS USING SUBROUTINES AND LIBRARIES THAT REQUIRE TABLE HANDLING, SEQUENTIAL, RANDOM AND INDEXED FILE PROCESSING.
2. BE ABLE TO SEPERATELY COMPILE AND ASSEMBLE SUBPROGRAMS. THE STUDENT WILL THEN LINK BASIC AND ASSEMBLER. THUS EXPERIENCE IS GAINED IN RUNNING PROGRAMS THAT HAVE BOTH HIGH AND LOW LEVEL LANGUAGE COMPONENTS.

BLOCK III PROGRAMMING PERIPHERALS

THE STUDENT WILL BE USING THE "MICRO APPLICATIONS TRAINER" (MAT) KITS TO DEVELOP A BETTER UNDERSTANDING OF THE DOS AND BIOS ROUTINES TO PERFORM I/O PROCESSING. SPECIFICALLY, THE STUDENT WILL:

1. REVIEW AND UNDERSTAND DIRECT MEMORY ACCESS (DMA), SYSTEM MEMORY, I/O MAPPING, MEMORY REFRESH TECHNIQUES, AND DATA TRANSFERS.
2. UNDERSTAND PROCESS HARDWARE TIMING AND INTERPRET TIMING DIAGRAMS AND USE LOGIC ANALYZERS.
3. USE AND UNDERSTAND REAL WORLD APPLICATIONS OF THE IBM PC'S I/O CAPABILITIES AT A SYSTEM LEVEL

ANTICIPATED LENGTH OF BLOCK: TWO WEEKS

BLOCK IV KEYBOARD/ DISPLAY AND SENSOR MODULES

THE STUDENT WILL BE USING THE NEWLY ACQUIRED "SENSOR MODULE" AND "KEYBOARD/DISPLAY MODULE" FROM E&L INSTRUMENTS LTD. THE STUDENT WILL BE COMPLETING EXPERIMENTS USING THESE MODULES THAT:

1. DEMONSTRATE KEYPAD SCANNING, DISPLAY MULTIPLEXING, CTC FUNCTIONS, AND PIO FUNCTIONS.
2. EMPLOY SENSORS FOR LIGHT, MOISTURE AND TEMPERATURE RECORDING AND CONTROL.
3. STUDY THE 8255 PROGRAMMABLE PERIPHERAL INTERFACE (PPI), 8253 PROGRAMMABLE INTERVAL TIMER (PIT), AND THE RS-232 COMMUNICATIONS SERIAL PORT.

ANTICIPATED LENGTH OF BLOCK: THREE WEEKS

BLOCK V MOTOR MODULE

THE STUDENT WILL BE USING THE NEWLY ACQUIRED "MOTOR MODULE" FROM E&L INSTRUMENTS LTD. THE STUDENT WILL BE COMPLETING EXPERIMENTS USING THIS MODULE THAT:

1. UTILIZE AND CONTROL DC MOTORS, STEPPER MOTORS, AND TACHO GENERATORS.
2. DEMONSTRATE PROCESS CONTROL CONCEPTS OF VELOCITY FEEDBACK AND POSITIONAL FEEDBACK CONTROL.

ANTICIPATED LENGTH OF BLOCK: THREE WEEKS