

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: COMPUTER SYSTEMS

CODE NO.: CET 306-6

PROGRAM: ELECTRICAL/ELECTRONIC

SEMESTER: FIVE

AUTHOR: PETER SAVICH

DATE: JULY 18, 1989

PREVIOUS OUTLINE
DATED: MAY 18, 1988

APPROVED: *P. Savich* 89/09/06
CHAIRPERSON DATE

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CODE NO.:
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TOTAL CREDIT HOURS: 90

LENGTH OF COURSE: 6 HOURS PER WEEK FOR 15 WEEKS

PREREQUISITE(S): CET 225 OR CET 228
CET 205

I. PHILOSOPHY / GOALS

THE OBJECTIVES OF THIS COURSE ARE TO PROVIDE THE STUDENT WITH A KNOWLEDGE OF THE PDP-11 FAMILY OF COMPUTERS AND THE PRACTICAL EXPERIENCE OF PROGRAMMING IN ASSEMBLY LANGUAGE USING THE PDP-11 COMPUTERS.

THE STUDENT WILL DEVELOP SKILLS IN FORMULATING AND TESTING SOFTWARE AT THE ASSEMBLY LANGUAGE LEVEL. SUCH COMPUTING SKILLS ARE TO INCLUDE DEVELOPMENT OF SOFTWARE FOR REAL TIME MONITORING AND CONTROLLING APPLICATIONS.

PETER SAVICH

AUTHOR:

JULY 18, 1989

DATE:

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PREVIOUS OUTLINE

DATED:

[Signature]
DATE

[Signature]
CHAIRPERSON

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II. STUDENT PERFORMANCE OBJECTIVES

UPON SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENT WILL BE ABLE TO:

1.
BE PROFICIENT IN WRITING ASSEMBLY PROGRAMS USING THE EDITOR AVAILABLE FOR BOTH THE MULTI-TASKING OPERATING SYSTEM CALLED RSX-11M AND THE SINGLE USER OPERATING SYSTEM CALLED RT-11.
2.
THE STUDENT SHOULD THEN BE CAPABLE OF ASSEMBLING, LINKING, RUNNING AND DEBUGGING THE PROGRAMS.
3.
USE THE EIGHT ADDRESSING MODES
4.
TRANSLATE MNEMONICS INTO MACHINE CODE
5.
STRUCTURE ALL PROGRAMS TO CONFORM TO STANDARDS
6.
DEMONSTRATE MORE COMPLEX BUT REALISTIC APPLICATIONS REQUIRING THE USE OF THE ASSEMBLY LANGUAGE. PERIPHERALS SUCH AS A/D, D/A, CLOCK/COUNTERS WILL BE EMPLOYED TO CONTROL SERVO-MOTORS.
7.
USE TRAPS, INTERRUPTS, AND POLLING TECHNIQUES FOR USE IN CONTROL OF THE PERIPHERALS.

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III. TOPICS TO BE COVERED

1. REVIEW BOOTING UP THE MS DOS OPERATING SYSTEM, MS DOS COMMANDS, MASM ASSEMBLY, NORTON EDITOR.

2. ARCHITECTURE OF THE PDP-11

3. REGISTERS, ADDRESSING MODES, AND INSTRUCTION SET OF THE PDP-11

4. ASSEMBLY LANGUAGE PROGRAMMING

5. FLOATING POINT INSTRUCTIONS

6. PERIPHERAL DEVICES

7. INTERRUPTS AND TRAPS

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IV. LEARNING ACTIVITIES

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LEARNING ACTIVITIES

REQUIRED RESOURCES

1.0 REVIEW BOOTING UP/MS DOS/ 8088 ASSEMBLY/EDITORS

UPON SUCCESSFUL COMPLETION OF THIS UNIT,
THE STUDENT WILL BE ABLE TO:

TEXT: PROGRAMMING
16 BIT MACHINES

1.1 USE THE MS DOS COMMANDS
FORMAT DISKS

HANDOUTS
ASSIGNMENT

1.2 USE NORTON'S EDITOR

1.3 WRITE SIMPLE 8088 ASSEMBLY PROGRAMS

1.4 USE DEBUG TO EXAMINE, CREATE SIMPLE
8088 ASSEMBLY PROGRAMS

2.0 ARCHITECTURE OF THE PDP-11

UPON SUCCESSFUL COMPLETION OF THIS UNIT,
THE STUDENT WILL BE ABLE TO:

TEXT: PROGRAMMING
16 BIT MACHINES

2.1 DESCRIBE THE ORGANIZATION OF
THE DIGITAL COMPUTER

TEXT CHAP. 3,4
ASSIGNMENT

2.2 KNOW THE 8 ADDRESSING MODES, 8 GENERAL
REGISTERS

2.3 WRITE SIMPLE MACRO-11 ASSEMBLY PROGRAMS

3.0 REGISTERS, ADDRESSING MODES, AND INSTRUCTION SET OF THE
PDP-11

UPON SUCCESSFUL COMPLETION OF THIS UNIT,
THE STUDENT WILL BE ABLE TO:

TEXT: PROGRAMMING
16 BIT MACHINES

3.1 USE DEBUG TO EXAMINE, CREATE SIMPLE
MACRO-11 ASSEMBLY PROGRAMS

TEXT: CHAP. 5

3.2 TRANSLATE MNEMONIC INSTRUCTIONS INTO
MACHINE CODE

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4. ASSEMBLY LANGUAGE PROGRAMMING

UPON SUCCESSFUL COMPLETION OF THIS UNIT,
THE STUDENT WILL BE ABLE TO:

TEXT: PROGRAMMING
16 BIT MACHINES

4.1 USE EITHER "SMARTTERM" OR "EM220"
EMULATION SOFTWARE

HANDOUTS

4.2 EDIT, ASSEMBLE, LINK, DEBUG SIMPLE
ASSEMBLY PROGRAMS

HANDOUTS

4.3 WITHIN DEBUG "ODT": SET BREAKPOINTS,
ALTER REGISTERS, ALTER MEMORY CONTENTS,
SINGLE AND MULTI-STEP THROUGH PROGRAMS

HANDOUTS
DEMONSTRATION
ASSIGNMENT

4.4 USE SUBROUTINES AND MACROS

TEXT: CHAP. 6

4.5 LINK SEPARATE FILES FOR RUNNING

4.6 LINK HIGH AND LOW LEVEL LANGUAGES

HANDOUTS

5.0 FLOATING POINT INSTRUCTIONS

UPON SUCCESSFUL COMPLETION OF THIS UNIT,
THE STUDENT WILL BE ABLE TO:

TEXT: PROGRAMMING
16 BIT MACHINES

5.1 DESCRIBE SINGLE AND DOUBLE PRECISION
IS ACCOMPLISHED USING FLOATING POINT

TEXT: CHAP. 7
HANDOUTS

5.2 USE THE EXTENDED INSTRUCTION SET

HANDOUTS
ASSIGNMENT

6.0 PERIPHERAL DEVICES

UPON SUCCESSFUL COMPLETION OF THIS UNIT,
THE STUDENT WILL BE ABLE TO:

TEXT: PROGRAMMING
16 BIT MACHINES

6.1 DESCRIBE THE I/O DEVICES USED
BY THE PDP-11 COMPUTERS

TEXT: CHAP. 8

6.2 WRITE PROGRAMS THAT PROVIDE KEYBOARD
INPUT AND CONSOLE OUTPUT AS I/O

ASSIGNMENT

6.3 DESCRIBE INTERRUPT AND POLLING TECHNIQUES

6.4 USE THE D/A, A/D, CLOCK/COUNTER DEVICES
OF THE RT-11 OP/SYS MINIC UNITS

ASSIGNMENT

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7.0 INTERRUPTS AND TRAPS

UPON SUCCESSFUL COMPLETION OF THIS UNIT,
THE STUDENT WILL BE ABLE TO:

TEXT: PROGRAMMING
16 BIT MACHINES

7.1 PROGRAM IN ASSEMBLY INTERRUPTS
AND TRAPS

TEXT: CHAP. 9
ASSIGNMENT

7.2 USE INTERRUPT DRIVEN I/O DEVICES

7.3 DEVELOP TRAP AND INTERRUPT HANDLERS
OR SERVICE ROUTINES

7.4 TRANSFER BLOCKS OF DATA AND DMA

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V. METHOD(S) OF EVALUATION

1.

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

THE TENTATIVE DATES ARE: OCT 5 /89
NOV 3 /89
DEC 19/89

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

2.

THE STUDENT WILL BE ASSESSED THROUGH A SERIES OF UNANNOUNCED QUIZZES. THE TOTAL WEIGHT OF THESE QUIZZES 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 HIS/HER ABILITY TO ANSWER QUESTIONS ABOUT THE LAB ASSIGNMENT ONCE SUBMITTED. THE STUDENT'S RESPONSE TO THESE LAB DEMONSTRATION QUESTIONS WILL BECOME PART OF HER/HIS "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%.

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SUMMARY OF FINAL MARK

1.	TESTS	60%
2.	QUIZZES	10%
3.	ASSIGNMENTS	25%
4.	DEMOS	5%

		100%

5. ATTENDANCE 2% BONUS ONLY

COURSE GRADING SCHEME

A+	90+	OUTSTANDING ACHIEVEMENT
A	80 - 89	ABOVE AVERAGE ACHIEVEMENT
B	70 - 79	AVERAGE ACHIEVEMENT
C	55 - 69	SATISFACTORY ACHIEVEMENT
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.

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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 "REPEAT" 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
- WRITING OF COMPREHENSIVE SUPPLEMENTAL EXAMINATION

OUTSTANDING ACHIEVEMENT	90+	A+
ABOVE AVERAGE ACHIEVEMENT	80 - 89	A
AVERAGE ACHIEVEMENT	70 - 79	B
SATISFACTORY ACHIEVEMENT	60 - 69	C
UNSATISFACTORY GIVEN AT MIDTERM ONLY		U
SATISFACTORY GIVEN AT MIDTERM ONLY		S
REPEAT		R
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 150 DAYS.		X

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VI. REQUIRED STUDENT RESOURCES

THE TEXT REQUIRED TO BE PURCHASED BY STUDENTS ARE:

TEXTBOOK:

"PROGRAMMING 16-BIT MACHINES: THE PDP-11,8086, AND M68000"

BY WILLIAM H. JERMANN, PRENTICE-HALL.

THE STUDENTS WILL ALSO BE EXPECTED TO PURCHASE APPROXIMATELY 10 FLOPPY DISKS 5 AND ONE QUARTER INCH, DOUBLE SIDED, DOUBLE DENSITY.

THE STUDENT WILL ALSO HAVE ISSUED TO THEM ONE EIGHT INCH FLOPPY DISK. THIS DISK MUST BE RETURNED AT THE END OF THE SEMESTER.

VII. ADDITIONAL RESOURCE MATERIALS (AVAILABLE IN COLLEGE LIBRARY)

THERE ARE MANY OTHER BOOKS ON ASSEMBLER LANGUAGE FOR THE PDP-11 FAMILY OF COMPUTERS.

VIDEO TAPES: THE ONTARIO TV SERIES: THE EDUCATION OF MIKE MACMANNIS. THE 13 PART SERIES COMPUTERS AND COMPUTER LITERACY.

PERIODICALS: DECUS, COMPUTING CANADA

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VIII. SPECIAL NOTES

FOR THE ELECTRICAL & ELECTRONIC STUDENTS THE CET306 COURSE IS BEING OFFERED THIS YEAR (1989) AND FOR THE FUTURE, USING THE PDP-11 FAMILY OF COMPUTERS. THE CET 315 "INTERFACING" COURSE OF THE SIXTH SEMESTER COMPLETES ALL THE COMPUTER RELATED COURSE MATERIAL OF THE ELECTRICAL/ ELECTRONIC PROGRAM.

THIS IS A NEWLY REVISED COURSE, SO THE COURSE OUTLINE MAY HAVE TO BE ADJUSTED DURING THE SEMESTER. STUDENTS WILL BE NOTIFIED OF ANY CHANGES NEEDED.