1989

A Curriculum Response to Budgetary and Marketing Pressures on a Two-Year Community College Engineering Technology Program (Microprecision Technology)

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A CURRICULUM RESPONSE TO BUDGETARY AND MARKETING PRESSURES ON A TWO-YEAR COMMUNITY COLLEGE ENGINEERING TECHNOLOGY PROGRAM (MICROPRECISION TECHNOLOGY)

(TITLE)

BY

GERALD R. HOUGH

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Specialist in Education

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1989
YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

5 Jun 89
DATE

ADVISER

5 Jun 89
DATE

DEPARTMENT HEAD

A CURRICULUM RESPONSE TO BUDGETARY AND MARKETING PRESSURES ON A TWO-YEAR COMMUNITY COLLEGE ENGINEERING TECHNOLOGY PROGRAM (MICROPRECISION TECHNOLOGY)

BY

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B.S., University of Illinois, 1972

M.Ed., University of Illinois, 1973

ABSTRACT OF THESIS

Submitted in partial fulfillment of the requirements
for the degree of Specialist in Education at the
Graduate School of Eastern Illinois University

CHARLESTON, ILLINOIS

1989

The process described is a program level response to institutional-wide budgetary restraints. The program in question is a two-year engineering technology associate degree program (Microprecision Technology). The major focus deals with:

1. reducing unit cost
2. improving marketability (recruiting)
3. improving transferability (as it relates to recruiting

The reductions in cost center around the ratio of contact hours to credit hours in the specialty courses as well as a reduction in the number of such courses. Issues dealing with marketability are directly related to the unique nature of the program and the difficulties involved in the public presentation of such a program. Increasing the transferability of this "nontransfer" program is seen as a method of focusing the attention of the growing number of entering students who wish to keep the transfer option open to them.

The above mentioned concerns necessitated the curriculum revisions described and included in this document.

ACKNOWLEDGMENTS

I would like to recognize those individuals who have given specific assistance in this effort to restructure the Microprecision Technology program. The following members of the program advisory committee provided valuable counsel in shaping the new curriculum to best serve their specific industries:

Mark Behrman, Manufacturing Supervisor; Schaevitz Engineering, Pennsauken, NJ

Cary Mannaberg, Program Director; State Technical Institute, Plainwell, MI

Eric Reeser, Senior Engineer; Ampex Corporation, Redwood City, CA

William O. Smith Jr., Industrial Consultant; Boston, MA

William Clary, Microprecision instructor at Parkland College, has provided insightful reactions and willingly acted as a soundingboard for many of the final decisions concerning program changes. In addition, Bill assisted in the revisions for MPT 111 and 112 and the program placement list and maps.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

The Community College

The public two-year college is a higher education phenomenon of the twentieth century. The first Junior College, the common term used in the early half of the 1900's, was established in Joliet, Illinois in 1901. The development of similar institutions was slow but steady during the first three decades (Mitzel, 1982).

The institutional emphasis before 1930 was the continuation of the academic function of high school and preparation for entry into baccalaureate oriented institutions. After 1930 the emphasis shifted to occupational and vocational training. This movement was fueled in part by the 1944 Servicemen's Readjustment Act known to most as the G.I. Bill (Vaughan, 1985). The most recent shift, in the 1970's has been to provide services to the life-long learner.

The rapid growth in the rate of birth during the 1950's and 1960's influenced the community college as it did all other phases of education. A review of the top ten concerns of educators during those years indicates a dramatic need for more elementary and secondary schools and teachers (Britannica Book of the Year 1952-1965). It

follows that as these "baby boomers" moved through the college years, growth in the number and the size of higher education institutions would be needed. Furthermore, as they continue through their lifespan, it is logical that the post-secondary educational emphasis would shift to life-long learning.

The number of public two-year institutions reached 1266 in 1985 (U.S. Department of Education). State governments have assumed a major role in this movement, particularly in California, Florida, Illinois, New York, and Texas.

Today's community college must deal with all three major roles that have developed through this century. They are expected to provide:

1. The first two years of college for the baccalaureate-bound student.
2. Occupational and Vocational training.
3. Avenues for life-long learning.

With a large number of these institutions entering their third decade (most Illinois community colleges were started in the 1960's) it is time to reevaluate how well they are fulfilling these missions.

The evaluation of technical programs, particularly those that were started twenty or more years ago, is therefore of prime concern. With the rapid advancements

in technology and a changing work force, such monitoring is crucial.

This paper outlines the efforts involved in the evaluation and restructure of one such program.

The Microprecision Technology Program

Microprecision Technology is a two-year associate degree program at Parkland College, Champaign, Illinois, fitting in the general category of engineering technology. It is a unique program in that it is the only program of its kind in the state of Illinois and one of only three programs in the United States. The other programs, one in Kalamazoo, Michigan and the other in Paris, Texas, were both patterned after the Parkland program and started within the last three years.

The Parkland program originated at the University of Illinois, growing out of a 1967 research project. The Federal grant (grant no. OEG 4-6-062336-2081 January 1968) funding the program indicated all tools and equipment would be transferred to an area community college at the end of the project. The first year classes were offered at Parkland was 1967 so the conditions were ideal for the program to be transferred.

Microprecision Technology is based on the need of industry for a highly specialized technician who has a combination of the high degree of manual skill associated

with watch-making or instrument-making and a traditional engineering technology academic preparation. As industry continues to reduce the size of products, the need for program graduates continues to increase.

Now, over twenty years after the program began, it is crucial the program be reevaluated and restructured. It is still very successful in terms of processing students and placing graduates, however, enrollment has always been modest and instructional cost rather high. This was allowed in the growth years of Parkland College, but now that budgets are restricted, all programs are being critically reviewed regardless of their past success.

CHAPTER II

STATEMENT OF THE PROBLEM

The College administration continues to strongly support the Microprecision program, however they feel and this author agrees the program should be restructured with the following thoughts in mind:

1. Reducing unit cost
2. Improving marketability (recruiting)
3. Improving transferability (also a factor in recruiting)

Cost

Faculty at Parkland College are currently required to spend 15 to 17 hours in class per week (referred to as contact hours). However, students do not pay tuition by contact hour, they pay by credit hour.

Traditional lecture courses allow one credit hour to the student for one contact hour per week. Laboratory based courses have a wide variety of credit hour to contact hour ratios. The Microprecision courses have one of the least favorable ratios of any courses at the College, allowing students four credit hours for every eight hours of classroom time. Thus an instructor in

Microprecision is paid for 16 hours in class per semester, but the student is only paying for eight credit hours.

Another indication of program cost is the ratio between full and part-time faculty. If a portion of the program load can be taken by part-time instructors, there will be obvious cost benefits.

Program Marketability

From the program's inception, it has been challenging to recruit students in to the Microprecision program. It is felt the following reasons contribute to this:

1. The program does not communicate well to many nontechnical people.
2. The Parkland College staff (counselors, admissions personnel, etc.) have a difficult time describing the program to prospective students.
3. The horological (watch and clock repair) portion of the program is not well accepted by many prospective students.

Transferability

It is important for two-year programs (A.A.S.) to appeal to the interests of as broad a group of prospective students as possible; including students who would like to keep the option of transferring to a four-year institution open to them with the minimum loss of credit.

With the apparent increase in emphasis of baccalaureate preparation in secondary schools (fueled in part by the Illinois Board of Higher Education's 1993 educational mandates) and the strong community (Champaign-Urbana) orientation toward baccalaureate degrees, it is felt that it would be an advantage for A.A.S. degree programs to be associated with transfer. Currently this is not the case with Microprecision Technology.

CHAPTER III

PROCEDURES FOLLOWED

In an effort to systematically review the three major issues stated in the previous chapter (cost, marketability, and transfer), the following procedures will act as guidelines.

Cost

Program cost is most greatly influenced by faculty salaries. It is not uncommon for 60% to 80% of the program budgets to go toward salaries (Parkland program review results). It is therefore critical to closely review the program costs in comparison to other programs at the college.

I am not referring to salary scales, but rather to full-time to part-time ratios and lecture to lab equations. Realizing that this may be an extremely delicate issue, it has such impact on the budget that it must be the major focus of our study.

Therefore a major effort will be directed toward:

-- develop the most appropriate lecture hour to lab hour ratio through restructuring the curriculum

-- develop the most appropriate full-time to part-time faculty ratio through restructuring the curriculum changes

Program Marketability

It can be said that the Microprecision program is suffering from an identity crisis. The combination of a vague program title, extremely ambiguous course titles, and a long history of being associated with a quite different but widely known career field (watch and clock repair) attributes to this greatly.

The process selected to attempt to remedy this involves the following:

-- develop possibilities for a new program title using the program advisory committee as a resource

-- review course titles from other similar engineering technology two-year programs and compare these with the content and titles used in the microprecision program

-- integrate a sense of uniformity between the microprecision program and other similar programs

-- orient campus personnel to the changes (particularly student services personnel)

-- eliminate as many of the horological references from course descriptions and promotional materials as possible

Transferability

In an attempt to enhance the transferability of the program the following procedure will be followed:

-- survey the existing state technology baccalaureate programs for the most promising transfer possibilities and make comparisons of common courses

-- attempt to align course content and titles to those of transfer institutions.

The final revision of the microprecision curriculum should attempt to address as many of these issues as possible.

CHAPTER IV

REVIEW OF THE INFORMATION GATHERED

Cost

Curriculum

A review of the curriculum history of the microprecision program reveals that there has been no major changes during the twenty years. There were several minor changes in course structure and a slow but continual change in course content. The current course sequence (page 12) contains the following course clusters:

Course	# of Courses	Credit Hours	Contact Hours
Microprecision	8	34	64
Electronics	4	11	18
Drafting (CAD)	1	3	4
Physics	2	6	8
Mathematics	1	4	4
English	3	8	8
Social Science	2	6	6
TOTALS	21	72	112

As the totals suggest the student receives 112 hours of instruction, but pays tuition for only 72 credit hours. The credit hour to contact hour ratio is .643. It is

MICROPRECISION TECHNOLOGY

FIRST YEAR

Fall Semester	Cr. Hrs.
MPT 111 Introduction to Microprecision	4
MPT 112 Microprecision	4
DRT 131 Computer-Aided Drafting and Fabrication	3
MAT 134 Technical Mathematics II	4
ENG 101 Composition I	3
	18

Spring Semester	Cr. Hrs.
MPT 113 Microprecision and Instrumentation I	5
MPT 114 Microprecision and Instrumentation II	5
ELT 150 Introduction to Electronics	2
ELT 171 Basic Electronic Circuits	2
ENG 102 Composition II	3
Social Science Elective	3
	20

SECOND YEAR

Fall Semester	Cr. Hrs.
MPT 211 Advanced Microprecision Technology I	4
MPT 212 Advanced Microprecision Technology II	4
ELT 155 Digital Electronics	3
ELT 175 Service Techniques	4
PHY 111 Applied Physics: Mechanics	3
	18

Spring Semester	Cr. Hrs.
MPT 213 Microprecision Design and Construction I	4
MPT 214 Microprecision Design and Construction II	4
PHY 113 Applied Physics: Fluids, Heat and Optics	3
ENG 250 Technical Communications	2
Social Science Elective[3]	3
	16

obvious that the lower the ratio the more costly the program instruction and the higher the overall unit cost. This is the lowest ratio of any engineering technology program at Parkland.

While this ratio cannot be adjusted indiscriminately, it is important that it be considered very carefully when changes are made in the program.

Faculty Load

The issue of full-time faculty to part-time faculty is more closely related to the availability of part-time faculty in the daytime hours (8 am - 5 pm) than to any given ideal ratio. Since current scheduling calls for all MPT courses to be offered in the day and it is extremely difficult to find available MPT instructors during those hours, it will be difficult to alter this ratio. Any curriculum change that would encourage scheduling core courses in the evening, by providing a broader appeal for specific courses, would increase the possibility for part-time MPT instructors.

A move away from having all MPT courses taught by full-time instructors would have obvious positive impact on program cost. However, quality of instruction should be carefully considered during every step.

Program Marketability And Transferability

Program Title

The title microprecision technology was retained from the original research program mentioned in the background portion of this paper. It is unique in that it is not used anywhere else in industry or education to my knowledge. The advantages of retaining this title include: the title accurately describes the program of study; the title has gained a certain local and national reputation; and the title allows a factor of flexibility in its definition.

On the other hand, the advantages of changing the program title seem equally good. Although the title is accurate, it does not communicate to the nontechnical population (and some technical people) which includes prospective students, the college community, personnel departments of prospective employers, and some baccalaureate institution.

The advisory committee (Appendix A) assisted in generating possible alternative titles which included: micro mechanical technology; electro-mechanical technology; instrument technology; and micro engineering technology. Each title was considered carefully and each was discarded by the committee for being misleading and not representing the program at Parkland. The final recommendation was to retain the title.

Course Titles and Descriptions

Current course titles used in the program (page 16) such as: Introduction to Microprecision; Microprecision I; Microprecision II; and Microprecision and Instrumentation I, are thought to be too vague and do not add to further define the program. After reviewing other two-year and four-year programs (page 17) the following key words are common to describe similar course content: machining, materials, fabrication, design, mechanical, electro-mechanical, and industrial. New courses should include materials for industry, precision machining, design and fabrication courses, and at least one skills oriented title. An effort should also be made to eliminate the microprecision term from the course titles.

In addition, the course descriptions should also communicate a more generic message cutting across as many traditional engineering technology areas as possible. This would, of course, include the elimination of all horological references.

MICROPRECISION TECHNOLOGY

MPT 111 Introduction to Microprecision 2-6-4
Fundamental concepts of miniaturized timekeeping elements and the repair and adjusting of these elements. Basic measurement techniques. Prerequisite: concurrent enrollment in MPT 112 is recommended. Course fee: $15.

MPT 112 Microprecision 2-6-4
Microprecision machining and laboratory application of repair techniques for timekeeping instruments. Basic escapement work. Prerequisite: MPT 111 or concurrent enrollment in MPT 111. Course fee: $15.

MPT 113 Microprecision Instrumentation I 2-6-5
Introduction to precision machining techniques for gear cutting. Step-by-step procedure for servicing timekeeping instruments. Prerequisites: MPT 112 and concurrent enrollment in MPT 114 is recommended. Course fee: $15.

MPT 114 Microprecision and Instrumentation II 2-6-5
Fundamental concepts of mechanics applied to a variety of mechanical instruments. Prerequisite: MPT 113 or concurrent enrollment in MPT 113. Course fee: $15.

MPT 211 Advanced Microprecision Technology I 2-6-4
Microprecision gearing theory and miniature milling techniques. Prerequisite: MPT 114 and concurrent enrollment in MPT 212 is recommended. Course fee: $15.

MPT 212 Advanced Microprecision Technology II 2-6-4
Design and construction of basic electromechanical, micro-precision instruments. Prerequisite: MPT 211 or concurrent enrollment in MPT 211 is recommended. Course fee: $15.

MPT 213 Microprecision Design and Construction I 2-6-4
Theory of racks, snails, retarding and trip-type mechanisms. Prerequisites: MPT 212 and concurrent enrollment in MPT 214 is recommended. Course fee: $15.

MPT 214 Microprecision Design and Construction II 2-6-4
Design, construction and service of mechanical, electric, and pneumatic microprecision instruments and problems related to the manufacturing of subminiature products. Prerequisite: MPT 213 or concurrent enrollment in MPT 213. Course fee: $15.

MPT 298 Advanced Topics in Microprecision Technology 2-2-3
Advanced study in the fields of mechanics and electro-mechanics. Topics will be selected to meet the specific needs and interest of individual students or groups. Course may be taken twice for credit. Prerequisite: instructor approval. Course fee: depends on topic chosen.

TWO-YEAR COLLEGES AND TECHNOLOGY PROGRAMS

ILLINOIS

College	Programs
Danville Area Community College	Mechanical Technology
Highland Community College	Mechanical Technology
Joliet Junior College	Mechanical Design Technology
Oakton Community College	Mechanical Design
Prairie State College	Mechanical Design
	Mechanical Technology
Rock Valley College	Machine Design Technology
	Mechanical Technology
Wright College	Mechanical Technology

FOUR-YEAR COLLEGES AND TECHNOLOGY PROGRAMS

ILLINOIS

College	Programs
Eastern Illinois University	Industrial Technology
	Manufacturing Technology
Illinois State University	Industrial Technology
Northern Illinois University	Technology
Southern Illinois University	Engineering Technology

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

When reviewing the program problems and specific concerns listed in this paper, it appears a restructuring of the curriculum would address many, if not all, of them. From the information gathered, specific attention should be given to: decreasing the number of MPT courses unique to the program; increasing the credit hour to contact hour ratio; repackaging the course content to appeal to prospective students, assist in more accurately defining the program, and communicate transferability to four-year institutions.

With the guidance of the program advisory committee and program faculty, this author recommends the new program course sequence and course titles and descriptions on pages 19 and 20 respectively. The original eight MPT courses (page 16) have been reduced to seven with what is felt to be much more descriptive titles and more widely understandable descriptions.

The revised course clusters are as follows:

MICROPRECISION TECHNOLOGY

FIRST YEAR

Fall Semester	Cr. Hrs.
MPT 111 Precision Machining Techniques	4
MPT 112 Precision Skills And Assembly Techniques	4
MAT 134 or 124 Technical Mathematics II or College Algebra	4
DAP 137 or CSC Elective Introduction to DOS	2-3
DRT 114 AutoCAD (Computer Aided Drafting)	2
	16-17

Spring Semester	Cr. Hrs.
MPT 113 Component Design And Fabrication (Mechanical)	4
MPT 414 Machine Design And Fabrication	4
ELT 150 Introduction to Electronics	2
ELT 171 Basic Electronic Circuits	2
ENG 101 Composition I	3
Humanities/Social Science Elective	3-4
	18-19

SECOND YEAR

Fall Semester	Cr. Hrs.
MPT 211 Materials for Industry	3
MPT 212 Electromechanical Fabrication I (Motors)	5
ELT 155 Digital Electronics	3
ELT 175 Servicing Techniques	4
ENG 102 Composition II	3
	18

Spring Semester	Cr. Hrs.
MPT 213 Electromechanical Fabrication II Sensors) And Transducers)	5
ELT 215 PC Board Fabrication	3
PHY 11 or 121 Applied Physics: Mechanics or General Physics I	3-4
Humanities/Social Science Elective	3-4
	14-16

MICROPRECISION TECHNOLOGY

Revised Course Description

MPT 111 Precision Machining Techniques 2-4-4
An introduction to turning, milling and drilling operations with emphasis on the preparation and maintenance of tooling. Additional attention will be given to the use of the instrument makers lathe with tolerances of .01 millimeter and drilling holes less than .5 millimeter. A wide variety of measuring devices will be used. Course Fee: $20.

MPT 112 Precision Skills and Assembly Techniques 2-4-4
The development of highly refined manual skills through an in-depth investigation of precision devices. Basic mechanical principles, friction, and lubrication as they apply to microprecision devices will be stressed. Course Fee: $20.

MPT 113 Component Design and Fabrication (Mechanical) 2-4-4
The principles of design and fabrication as they apply to miniature mechanical components. Levers, cams and actuators are stressed. Prerequisite: MPT 111, DRT 114 and concurrent enrollment in MPT 114. Course Fee: $20.

MPT 114 Machine Design and Fabrication 2-4-4
The fundamental concepts of mechanical design are investigated and applied through fabrication projects. Emphasis is placed on gearing, bearings, fasteners and springs. The fabrication of prototypes is stressed. Prerequisite: MPT 113 or concurrent enrollment. Course Fee: $20.

MPT 211 Materials for Industry 3-0-3
A survey of materials commonly used by design engineers. Materials include ferrous metals, nonferrous metals, plastics, and ceramics. Additional topics will include testing, heat-treating, finishing and the use of adhesives. Prerequisite: MAT 131. Course Fee: $10.

MPT 212 Electromechanical Fabrication I (Motors) 3-5-5
An introduction to fractional and subfractional horsepower electric motors. The fabrication of motor prototypes will be stressed. Prerequisite: MPT 114 and ELT 171. Course Fee: $20.

MPT 213 Electromechanical Fabrication II (Sensors and Transducers) 3-5-5
The principles of measuring temperature, pressure, level, flow, displacement, velocity and acceleration. The design and construction of miniature precision electromechanical instruments will be examined through prototype fabrication. Prerequisite: MPT 212, ELT 175 or concurrent enrollment and ELT 215 or concurrent enrollment. Course Fee: $20.

Course	# of Courses	Credit Hours	Contact Hours
Microprecision	7	29	43
Electronics	5	14	23
Drafting (CAD)	1	2	2
Computer	1	2	2
Physics	1	2	2
Mathematics	1	4	4
English	2	6	6
Social Science	2	6	6
TOTALS	20	66	86

Comparing the totals of the original clusters (page 12) to those proposed, show the student now receive 86 hours of instruction and pay tuition for 66 hours. The new ratio is a much more favorable .747. It is important to realize that great effort was made to make these changes with the minimum amount of negative impact to the student learning. However that can not be properly evaluated for several years.

The major changes occurred within the Microprecision courses, eliminating one course and dramatically changing the lecture to lab ratio in the others. Since a major emphasis of the program is to develop a high degree of manual skills in the students, the impact of reduced lab hours should be closely monitored.

In addition to the microprecision course eliminated (MPT 214 - Microprecision Design and Construction II [4 credit hour]), the following courses were dropped from the program: DRT 131 - Computer Aided Drafting and Fabrication (3 credit hours), PHY 113 - Applied Physics: Fluids, Heat and Optics (3 credit hours), and ENG 250 - Technical Communications (2 credit hours). The courses added are DTR 114 - Computer Aided Drafting (2 credit hours) and DAP 127 - DOS for Microcomputers (2 credit hours).

DRT 131 consisted of eight weeks of machine tool training and eight weeks of computer aided drafting. The machine tool basics were moved into MPT 111 - Precision Machine Techniques to unite the material with the unit dealing with machining on the instrumentmakers lathe. DRT 114 was added to provide the CAD instruction.

It has been the writers observation that students entering DRT 114 without any computer training have a very difficult time during the first few weeks of class (it is only an eight week class). DAP 137 - DOS for Microcomputers was added to help these students. Those who have previous experience with computers are allowed to take a computer science elective.

PHY 113 - Applied Physics: Fluids, Heat and Optics was being withdrawn from the catalog by the Natural

Science Department. The remaining substitute, PHY 112 - Applied Physics: Heat and Electricity, appears to have too much material in common with ELT 150 and MPT 212, therefore the second physics course was dropped.

It has long been contented by many faculty in technical programs that ENG 101 - Composition I, ENG 102 - Composition II, and ENG 250 - Technical Communications (eight credit hour) is more English than most two-year engineering technology programs can afford in terms of time. However as ENG 101 and 102 are mandated by the college, the only way Technical Communication (ENG 250) could be included in a technical program was to include it as a third English class. It was decided to drop ENG 250 from the program and indicate to the curriculum committee that ENG 101 and 102 are not in the best interest of the students, however current college requirements allow no choice.

Also one course, MPT 211 - Material for Industry, is structured in such a way as to allow students outside the program to enroll (no prerequisites). This is particularly important in a 200 level course.

The new course titles and course descriptions reflect the repackaging of the program content and are incorporated into the course outlines. The course outlines made up a major portion of the package presented to the Parkland

College Curriculum Committee on October 25, 1988 for final approval. The entire package as approved is included with this document (Appendix B).

The marketability of the Microprecision Technology program, in this writer's opinion, has been greatly increased simply through redesigning the course titles and the course descriptions. It is no longer necessary to have a program representative on hand to understand the central themes of the program. This is a very important part of the public presentation of the program.

The college catalog contains the program course sequence and the course descriptions and often is the first contact a student has with programs at the college. Since programs are no longer listed in alphabetical order college-wide (they are listed in alphabetical order by departments) it is easier to identify all of the programs in a particular area; in this case Engineering Science and Technology. The title Microprecision Technology is not very descriptive to the general population, therefore, placing the program with similar programs and improving course descriptions is crucial.

The next step a student takes in pursuing his/her interest in a program is often obtaining a program brochure. A major change is being made this year in the brochures at Parkland. The brochures are now folders that represent

clusters of programs rather than single programs. This will serve to inform anyone who is interested in any engineering technology program that Microprecision is in that cluster and should be considered. The information sheets concerning microprecision will include the following:

program course sequence (page 19)

program course descriptions (page 20)

program fact sheet (Appendix C)

program placement list and maps (Appendix D)

In an effort to appeal to those who many be attracted to a transfer engineering technology program, alternate transfer courses are listed where appropriate on the program course sequence sheet.

It is believed that the major revisions described in these pages have responsibly dealt with the concerns outlined in the earlier chapters. The remaining concerns of the author are in the areas of sufficient lab time for skills development and institutional commitment to program recruiting. These areas must be monitored carefully by program personnel over the next few years.

APPENDICES

APPENDIX A

MICROPRECISION TECHNOLOGY

ADVISORY COMMITTEE

MICROPRECISION TECHNOLOGY

ADVISORY COMMITTEE

Mark Behrman	Manufacturing Supervisor	Scheavitz Eng. Pennauken, NJ
Cary Mannaberg	Program Director	State Institute Plainwell, MI
Richard Milo	Development Engineer	Archive Costa Mesa, CA
Eric Reeser	Senior Engineer	Ampex Corp. Redwood City, CA
William O. Smith	Industrial Consultant	Boston, MA

APPENDIX B

CURRICULUM COMMITTEE PROPOSAL FOR MICROPRECISION TECHNOLOGY (APPROVED OCTOBER 25, 1988)

PARKLAND COLLEGE

☐ NEW PROGRAM

☒ REVISED PROGRAM

CAREER PROGRAM INFORMATION
FORM FOR CURRICULUM COMMITTEE
(For use after August 1, 1988; discard all others)

The following information must accompany proposals of new career programs before committee action will be taken. Revised program proposals may omit items 8-10.

I. Programs

1. Name of program and degree offered: Microprecision Technology, A.A.S.

2. If this proposal addresses recommendations from program evaluation, cite Faculty Review Committee Report and explain.

3. Minimum credit hours needed to graduate 66

4. First semester to be offered (New or Revised) Fall, 1989

5. Cost of additional faculty 0

6. Cost for additional and/or special equipment, supplies and facilities.
0

7. Attach a copy of the program in catalog form.

8. Will special scheduling procedures need to be used?
No

9. Use of outside funds? If so, list sources.

PARKLAND COLLEGE

10. Has this program been tried at other two-year colleges? If so, where? What information is available?

11. Attach a summary of the need study.

12. List the courses with credit hours according to their classification and the college objective(s) each course addresses.

Specialty or Major	Hours	Supportive	Hours	General Education Core	Hours
MPT 111	4	MAT 134	4	ENG 101	3
MPT 112	4	PHY 111	3	ENG 102	3
MPT 113	4	DAP 114	2	SS/HUM. ELECTIVE	3-4
MPT 114	4	DRT 114	2	SS/HUM. ELECTIVE	3-4
MPT 211	3	ELT 150	2		
MPT 212	5	ELT 171	2		
MPT 213	5	ELT 175	4		
		ELT 215	3		
		ELT 155	3		
	29 Total		25 Total		12-14 Total

14. List courses being:

Deleted	Added	Changing Classification
ENG 250	DAP 114	
PHY 113	DRT 114	
MPT 214	ELT 215	
DRT 131		

PROPOSED BY _____ DATE 9/30/88

CURRICULUM CHAIRPERSON _____ DATE _____

DEPARTMENT CHAIRPERSON _____ DATE 9/30/88

VICE PRESIDENT FOR ACADEMIC ADMINISTRATION _____ DATE _____

APPROVAL: YES _____ NO _____

EFFECTIVE _____ 19____

NEWMAN COM PROINFO FRM 071388

MICROPRECISION TECHNOLOGY

FIRST YEAR

FALL SEMESTER

MPT 111 Precision Machining Techniques	4
MPT 112 Precision Skills and Assembly Techniques	4
MAT 134 or 124 Technical Mathematics II or College Algebra	4
DAP 114 or CSC Elective Introduction to Microcomputers	2-3
DRT 114 AutoCAD (Computer Aided Drafting)	2
	16-17

SPRING SEMESTER

MPT 113 Component Design and Fabrication (Mechanical)	4
MPT 114 Machine Design and Fabrication	4
ELT 150 Introduction to Electronics	2
ELT 171 Basic Electronic Circuits	2
ENG 101 Composition I	3
Social Science/ Humanities Elective	3-4
	18-19

SECOND YEAR

FALL SEMESTER

MPT 211 Materials for Industry	3
MPT 212 Electromechanical Fabrication I (Motors)	5
ELT 155 Digital Electronics	3
ELT 175 Servicing Techniques	4
ENG 102 or SPE 101 Composition II or Introduction to Speech Communication	3
	18

SPRING SEMESTER

MPT 213 Electromechanical Fabrication II (Sensors and Transducers)	5
ELT 215 PC Board Fabrication	3
PHY 111 or 121 Applied Physics:Mechanics or General Physics I	3-4
Social Science/ Humanities Elective	3-4
	14-16

MICROPRECISION TECHNOLOGY

Associate in Applied Science (A.A.S.)
Minimum graduation requirement — 72 semester hours [1]

The Microprecision Program consists of a theoretical and practical study of electro-mechanical instrumentation. This program incorporates the theoretical in terms of practical application with emphasis on design and fabrication of small precise devices such as mechanisms for aviation, electronics, and medical and industrial instrumentation.

FIRST YEAR

FALL SEMESTER	Cr. Hrs.
MPT 111 Introduction to Microprecision	4
MPT 112 Microprecision	4
DRT 131 Computer-Aided Drafting and Fabrication	3
MAT 134 Technical Mathematics II	4
ENG 101 Composition I	3
	18

SPRING SEMESTER	Cr. Hrs.
MPT 113 Microprecision and Instrumentation I	5
MPT 114 Microprecision and Instrumentation II	5
ELT 150 Introduction to Electronics	2
ELT 171 Basic Electronic Circuits	2
ENG 102 Composition II	3
Social Science Elective	3
	20

SECOND YEAR

FALL SEMESTER	Cr. Hrs.
MPT 211 Advanced Microprecision Technology I	4
MPT 212 Advanced Microprecision Technology II	4
ELT 155 Digital Electronics	3
ELT 175 Service Techniques	4
PHY 111 Applied Physics: Mechanics	3
	18

SPRING SEMESTER	Cr. Hrs.
MPT 213 Microprecision Design and Construction I	4
MPT 214 Microprecision Design and Construction II	4
PHY 113 Applied Physics: Fluids, Heat and Optics	3
ENG 250 Technical Communications	2
Social Science Elective[3]	3
	16

[1] Students must also fulfill the constitutional examination requirement (see page 69) and other graduation requirements as listed on page 88.
[3] For General Education Elective Courses, see pages 70-71.

MICROPRECISION TECHNOLOGY

Associate in Applied Science (A.A.S.)
Minimum graduation requirement — 72 semester hours [1]

The Microprecision Program consists of a theoretical and practical study of electro-mechanical instrumentation. This program incorporates the theoretical in terms of practical application with emphasis on design and fabrication of small precise devices such as mechanisms for aviation, electronics, and medical and industrial instrumentation.

FIRST YEAR

FALL SEMESTER	Cr. Hrs.
MPT 111 Introduction to Microprecision	4
MPT 112 Microprecision	4
DRT 131 Computer-Aided Drafting and Fabrication	3
MAT 134 Technical Mathematics II	4
ENG 101 Composition I	3
	18

SPRING SEMESTER	Cr. Hrs.
MPT 113 Microprecision and Instrumentation I	5
MPT 114 Microprecision and Instrumentation II	5
ELT 150 Introduction to Electronics	2
ELT 171 Basic Electronic Circuits	2
ENG 102 Composition II	3
Social Science Elective	3
	20

SECOND YEAR

FALL SEMESTER	Cr. Hrs.
MPT 211 Advanced Microprecision Technology I	4
MPT 212 Advanced Microprecision Technology II	4
ELT 155 Digital Electronics	3
ELT 175 Service Techniques	4
PHY 111 Applied Physics: Mechanics	3
	18

SPRING SEMESTER	Cr. Hrs.
MPT 213 Microprecision Design and Construction I	4
MPT 214 Microprecision Design and Construction II	4
PHY 113 Applied Physics: Fluids, Heat and Optics	3
ENG 250 Technical Communications	2
Social Science Elective[2]	3
	16

[1] Students must also fulfill the constitutional examination requirement (see page 69) and other graduation requirements, as listed on page 88.
[2] For General Education Elective Courses, see pages 70-71.

__X__ REQUIRED COURSE

_____ ELECTIVE COURSE

_____ NEW COURSE

__X__ REVISED COURSE (Circle revised items.)

PARKLAND COLLEGE
COURSE INFORMATION FORM
(For use after August 1, 1988; discard all others)

COURSE PREFIX AND NUMBER MPT 111 TITLE Precision Machining Techniques

CLASS HOURS 2 LABORATORY HOURS 4 CLINIC HOURS _____ CREDIT HOURS 4

COURSE PCS# _____ (Assigned by administration)

1. Catalog description of course including prerequisites and course fees (not more than 40 words).
   An introduction to turning, milling and drilling operations with emphasis on the preparation and maintenance of tooling. Additional attention will be given to the use of the instrument makers lathe with tolerances of .01 millimeter and drilling holes less than .5 millimeter. A wide variety of measuring devices will be used. Course fee: $20.
2. The attached course outline must contain the following: general course objectives, textbook(s) and other required materials with approximate cost, required reading lists--when appropriate, required writing assignments--when appropriate, and laboratory information (e.g., topics covered)--when appropriate
3. Methods of evaluation (essay exams, objective exams, term papers, projects, etc.)
   Essay exams, objective exams, projects.
4. Will additional and/or special equipment, library materials, supplies and/or facilities be needed or required? Please list and estimate cost.
   No
5. What is your rationale or evidence of need for this course?
   Increasing demand of industry for precise miniature mechanical and electro-mechanical devices.
6. Are there any other Parkland courses that are similar in content? If yes, which ones?
   no
7. For what programs would this course be supportive? Explain.
   Microprecision Technology
8. Does this course qualify as a general education course for any programs? Explain.
   no

PROPOSED BY _____ DATE 9-30-88

CURRICULUM CHAIRPERSON _____ DATE _____

DEPARTMENT CHAIRPERSON _____ DATE 9/30/88

VICE PRESIDENT FOR ACADEMIC ADMINISTRATION _____ DATE _____

APPROVAL: YES_____ NO _____

EFFECTIVE _____ 19 _____

Provide the following information on how this course is being offered at other Illinois community colleges:

Name of community college (at least three)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks

For baccalaureate-oriented courses, the following information is also needed:

Name of senior institution (at least 3)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 111

GENERAL COURSE OBJECTIVES: Give students a basic understanding of precision machining with various tools and machines.

TEXTBOOK(s):

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
1. Safety considerations	1			General lab safety procedures.
2. Measuring a) English system b) Metric system c) Vernier measuring devices d) Micrometer measuring devices e) Dial indicating devices	3	5		Measuring to precise tolerance with a variety of instruments in both metric and English systems.
3. Hand Tools a) Files b) Saws	2	5		Proper selection, care, and technique of hand tools.
4. Polishing and Abrasives a) Deburring b) Grinding c) Polishing d) Stoning	4	10		Various methods of polishing to enhance appearance and function.

(USE ADDITIONAL PAGES IF NECESSARY)

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 111

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
5. Instrument Makers Lathe a) Tool selection b) Tool sharpening and care c) Indexing d) Speed selection	5	10		Proper technique for use of the instrument makers lathe in fabrication of miniature components.
6. Engine lathe a) Safety b) Tool selection c) Tool sharpening d) Holding work e) Speed selection f) Machine setup g) Turning h) Drilling i) Threading	5	10		Proper usage of larger equipment to produce work with precise tolerances.
7. Drilling a) Safety b) Drill types c) Drill sharpening d) Micro drilling techniques e) Threading on drill press	3	7		Primary and secondary usage of the drill press in the production of components.

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 111

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
8. Milling a) Safety b) Tool selection c) Tool sharpening d) Holding work e) Speed selection f) Machine setup g) Milling technique	5	10		Mill use to shape components and techniques that provide precision results.
9. Heat treating a) Material slection b) Treating technique	2	3		Proper material selection and methods of treating metals for desired characteristics.

__X__ REQUIRED COURSE

_____ ELECTIVE COURSE

_____ NEW COURSE

__X__ REVISED COURSE (Circle revised items.)

PARKLAND COLLEGE
COURSE INFORMATION FORM
(For use after August 1, 1988; discard all others)

COURSE PREFIX AND NUMBER MPT 112 TITLE Precision Skills and Assembly

CLASS HOURS 2 LABORATORY HOURS 4 CLINIC HOURS _____ CREDIT HOURS 4

COURSE PCS# _____ (Assigned by administration)

1. Catalog description of course including prerequisites and course fees (not more than 40 words).
   The development of highly refined manual skills through an indepth investigation of precision devices. Basic mechanical principles, friction, and lubrication as they apply to microprecision devices will be stressed. Course fee: $20.

2. The attached course outline must contain the following: general course objectives, textbook(s) and other required materials with approximate cost, required reading lists--when appropriate, required writing assignments--when appropriate, and laboratory information (e.g., topics covered)--when appropriate

3. Methods of evaluation (essay exams, objective exams, term papers, projects, etc.)
   Essay exams, objective exams, projects

4. Will additional and/or special equipment, library materials, supplies and/or facilities be needed or required? Please list and estimate cost.
   No

5. What is your rationale or evidence of need for this course?
   Increasing demand of industry for employees with a basic understanding of mechanical devices and highly developed manual skills.

6. Are there any other Parkland courses that are similar in content? If yes, which ones?
   no

7. For what programs would this course be supportive? Explain.
   Microprecision Technology

8. Does this course qualify as a general education course for any programs? Explain.

PROPOSED BY _____ DATE 9-30-88

CURRICULUM CHAIRPERSON _____ DATE _____

DEPARTMENT CHAIRPERSON _____ DATE 9/30/88

VICE PRESIDENT FOR ACADEMIC ADMINISTRATION _____ DATE _____

APPROVAL: YES _____ NO _____

EFFECTIVE _____ 19 _____

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 112

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
5. Lubrication a) characteristics b) advantages/disadvantages c) selection d) working environment considerations e) application techniques	4	10		Develop the skill and knowledge to select and apply the correct lubrication, specifically to miniature devices.
6. Basic gear train calculations	4	3		Develop the correct proportion of speed and power for various applications.
7. Motion limiting devices a) escapement b) reverse escapements c) centrifugal governors	3	5		Understand the design and function of devices that control output.
8. Oscillating systems a) period and frequency b) moment of inertia	4	10		Understand the theory and adjustment of oscillating components.
9. Input power systems a) springs b) weights and pulleys c) electrical	3	6		Selection of types and specifications of input systems.

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 112

GENERAL COURSE OBJECTIVES: Give students a knowledge of basic mechanical principles and the manual skills necessary to construct miniature precision devices.

TEXTBOOK(s):

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
1. Methods of magnification a) optical comparitor b) loupe c) opti-visor d) tool maker microscope	2	3		Understand the different equipment and techniques of working under magnification.
2. Assembly/disassembly procedures of miniature mechanism.	4	10		Skill and technique of handling miniature components and devices.
3. Ultrasonic cleaning techniques a) chemicals b) equipment	2	3		Cleaning techniques used on micro devices.
4. Friction a) rolling and sliding b) coefficient of friction c) welded junction theory	4	10		Understand the different types of friction and their effect on mechanical devices.

(USE ADDITIONAL PAGES IF NECESSARY)

PARKLAND COLLEGE

Provide the following information on how this course is being offered at other Illinois community colleges:

Name of community college (at least three)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks

For baccalaureate-oriented courses, the following information is also needed:

Name of senior institution (at least 3)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks

__X__ REQUIRED COURSE

_____ ELECTIVE COURSE

_____ NEW COURSE

__X__ REVISED COURSE (Circle revised items.)

PARKLAND COLLEGE
COURSE INFORMATION FORM
(For use after August 1, 1988; discard all others)

COURSE PREFIX AND NUMBER MPT 113 TITLE Component Design and Fabrication (Mechanical)

CLASS HOURS 2 LABORATORY HOURS 4 CLINIC HOURS _____ CREDIT HOURS 4

COURSE PCS# _____ (Assigned by administration)

1. Catalog description of course including prerequisites and course fees (not more than 40 words).
   The principles of design and fabrication as they apply to miniature mechanical components. Levers, cams and actuators are stressed. Prerequisite: MPT 111, DRT 114 and concurrent enrollment in MPT 114. Course fee: $20.

2. The attached course outline must contain the following: general course objectives, textbook(s) and other required materials with approximate cost, required reading lists--when appropriate, required writing assignments--when appropriate, and laboratory information (e.g., topics covered)--when appropriate

3. Methods of evaluation (essay exams, objective exams, term papers, projects, etc.)
   Written examinations and laboratory projects

4. Will additional and/or special equipment, library materials, supplies and/or facilities be needed or required? Please list and estimate cost.
   No

5. What is your rationale or evidence of need for this course?

6. Are there any other Parkland courses that are similar in content? If yes, which ones?
   No

7. For what programs would this course be supportive? Explain.
   Microprecision Technology core course

8. Does this course qualify as a general education course for any programs? Explain.
   No

PROPOSED BY _____ DATE 9/30/88

CURRICULUM CHAIRPERSON _____ DATE _____

DEPARTMENT CHAIRPERSON _____ DATE 9/30/88

VICE PRESIDENT FOR ACADEMIC ADMINISTRATION _____ DATE _____

APPROVAL: YES _____ NO _____

EFFECTIVE _____ 19 _____

PARKLAND COLLEGE

Provide the following information on how this course is being offered at other Illinois community colleges:

Name of community college (at least three)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks
Wright College	MT 225 Mechanical Machine Design	4	1984-86	122	

For baccalaureate-oriented courses, the following information is also needed:

Name of senior institution (at least 3)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 113

GENERAL COURSE OBJECTIVES: The student should develop understanding of the skills necessary to design and fabricate basic mechanical components.

TEXTBOOK(s): MACHINE DESIGN FUNDAMENTAL (A PRACTICAL APPROACH) $38.50

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
I. Nature of machine components 1. Simple machines 2. Machine elements 3. Work, energy, and efficiency	4			I. The student should understand basic machine principles.
II. Aspects of design 1. Definition of design 2. The design process 3. Design criteria 4. Modes of failure	5			II. The student should know the design process.
III. Designing for strength 1. Materials 2. Working stresses 3. Fatigue 4. Impact derating factors	4			III. The student should understand the importance of material characteristics to the design process.

(USE ADDITIONAL PAGES IF NECESSARY)

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 113

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
IV. Component design 1. Direction of force 2. Physical effective and actual levers 3. Effective torque arms 4. Mechanical advantage 5. Lever analysis	5	5		IV. The student should be able to design a functional lever.
V. Lever fabrication 1. Layout 2. Optical comparator 3. Flat work	4	20		V. The student should be able to duplicate a miniature lever from a sample.
VI. Finishing techniques 1. Lapping and polishing 2. Burnishing 3. Diamaskeening 4. Coatings 5. Brush finish	4	10		VI. The student should be able to properly produce a brush finish, diamaskeening finish and lap and polish.
VII. Flycutters 1. Basic flycutter construction 2. Generate draws 3. Produce cutter to drawing 4. Demonstrate flycutter	4	25		VII. The student should be able to produce a gear by using a flycutter.

NEWMAN COM COURSE INFOFRM71388

__X__ REQUIRED COURSE

_____ ELECTIVE COURSE

_____ NEW COURSE

__X__ REVISED COURSE (Circle revised items.)

PARKLAND COLLEGE
COURSE INFORMATION FORM
(For use after August 1, 1988; discard all others)

COURSE PREFIX AND NUMBER MPT 114 TITLE Machine Design and Fabrication

CLASS HOURS 2 LABORATORY HOURS 4 CLINIC HOURS _____ CREDIT HOURS 4

COURSE PCS# _____ (Assigned by administration)

1. Catalog description of course including prerequisites and course fees (not more than 40 words).
   The fundamental concepts of mechanical design are investigated and applied through fabrication projects. Emphasis is placed on gearing, bearings, fasteners and springs. The fabrication of prototypes is stressed. Prerequisite: MPT 113 or concurrent enrollment. Course fee: $20.

2. The attached course outline must contain the following: general course objectives, textbook(s) and other required materials with approximate cost, required reading lists--when appropriate, required writing assignments--when appropriate, and laboratory information (e.g., topics covered)--when appropriate

3. Methods of evaluation (essay exams, objective exams, term papers, projects, etc.)
   written examinations and laboratory projects

4. Will additional and/or special equipment, library materials, supplies and/or facilities be needed or required? Please list and estimate cost.
   No

5. What is your rationale or evidence of need for this course?

6. Are there any other Parkland courses that are similar in content? If yes, which ones?
   No

7. For what programs would this course be supportive? Explain.
   Microprecision Technology core course

8. Does this course qualify as a general education course for any programs? Explain.
   No

PROPOSED BY _____ DATE 9/30/88

CURRICULUM CHAIRPERSON _____ DATE _____

DEPARTMENT CHAIRPERSON _____ DATE 9/30/88

VICE PRESIDENT FOR ACADEMIC ADMINISTRATION _____ DATE _____

APPROVAL: YES _____ NO _____

EFFECTIVE _____ 19 _____

PARKLAND COLLEGE

Provide the following information on how this course is being offered at other Illinois community colleges:

Name of community college (at least three)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks
Danville Area Community College	INMET 262 Basic Mechanisms	4	1987-88	128	
Highland Community College	MECTC 163 Mechanisms	3	1985-87	127	
Oakton Community College	ENG 131 Mechanisms	3	1987-88	173	

For baccalaureate-oriented courses, the following information is also needed:

Name of senior institution (at least 3)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 114

GENERAL COURSE OBJECTIVES: The student should develop an understanding of the design and fabrication of basic mechanical mechanisms.

TEXTBOOK(s): MACHINE DESIGN FUNDAMENTALS (A PRACTICAL APPROACH), $38.50

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
I. Rigid and elastic connections 1. Permanent connections 2. Detachable fasteners 3. Springs	3			I. The student should know the basic methods of mechanical connection and the applications of each.
II. Power transmission devices 1. Belt drives 2. Gears 3. Chain drives 4. Flexible couplings	2			II. The student should know the advantages and disadvantages of the three basic methods of power transmission and understand basic design considerations of each.
III. Gearing theory 1. Design principles 2. Spur and helical gears 3. Cycloidal gearing design 4. Involute gearing design 5. Gearing for nonparallel shafts	10			III. The student should understand the basic design principles of involute and cycloidal gearing.
IV. Bearings 1. Sliding bearings 2. Rolling-element bearings	5			IV. The student should know the basic construction of sliding and rolling-element bearings and understand the advantages and disadvantages of each.

(USE ADDITIONAL PAGES IF NECESSARY)

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 114

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
VII. Gearing fabrication 1. Using the universal indexing device 2. Cutting wheels and pinions 3. Mounting wheels on hubs and arbors	3	25		VII. The student should be able to fabricate a gear using the milling process.
VIII. Gear box fabrication 1. Manufacturing the plates 2. Posts and screws 3. Depthing 4. Finishing	3	30		VIII. The student should be able to fabricate a two-gear gearbox. All fasteners, plates, posts, gears and arbors must be fabricated from basic stock.

__X__ REQUIRED COURSE

_____ ELECTIVE COURSE

_____ NEW COURSE

__X__ REVISED COURSE (Circle revised items.)

PARKLAND COLLEGE
COURSE INFORMATION FORM
(For use after August 1, 1988; discard all others)

COURSE PREFIX AND NUMBER MPT 211 TITLE Materials for Industry

CLASS HOURS 3 LABORATORY HOURS 0 CLINIC HOURS _____ CREDIT HOURS 3

COURSE PCS# _____ (Assigned by administration)

1. Catalog description of course including prerequisites and course fees (not more than 40 words).
   A survey of materials commonly used by design engineers. Materials include ferrous metals, nonferrous metals, plastics, and ceramics. Additional topics will include testing, heat-treating, finishing and the use of adhesives. Prerequisite: MAT 131. Course Fee: $10.

2. The attached course outline must contain the following: general course objectives, textbook(s) and other required materials with approximate cost, required reading lists--when appropriate, required writing assignments--when appropriate, and laboratory information (e.g., topics covered)--when appropriate

3. Methods of evaluation (essay exams, objective exams, term papers, projects, etc.)
   written examinations

4. Will additional and/or special equipment, library materials, supplies and/or facilities be needed or required? Please list and estimate cost.
   no

5. What is your rationale or evidence of need for this course?
   Materials technology is basic to any mechanical technology oriented program.

6. Are there any other Parkland courses that are similar in content? If yes, which ones?
   no

7. For what programs would this course be supportive? Explain.
   Microprecision Technology core course

8. Does this course qualify as a general education course for any programs? Explain.
) no

PROPOSED BY _____ DATE 9/30/88

CURRICULUM CHAIRPERSON _____ DATE _____

DEPARTMENT CHAIRPERSON _____ DATE 9/30/88

VICE PRESIDENT FOR ACADEMIC ADMINISTRATION _____ DATE _____

APPROVAL: YES_____ NO _____

EFFECTIVE _____ 19 ____

PARKLAND COLLEGE

Provide the following information on how this course is being offered at other Illinois community colleges:

Name of community college (at least three)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks
Wright College	Mechanical Technology 103	3	1984-86	121	
Rock Valley College	Mechanical Technology 103	3	1985-87	230	
Oakton Community College	Mechanical Design 105	3	1987-88	202	

For baccalaureate-oriented courses, the following information is also needed:

Name of senior institution (at least 3)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 211

GENERAL COURSE OBJECTIVES: Assist the student in understanding the physical and chemical properties associated with common materials used in manufacturing industries.

TEXTBOOK(s): Materials and Processes in Manufacturing, $43.50

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
I. Testing of Engineering Materials 1. Tensile test. 2. Hardness testing. 3. Notched-by impact testing. 4. Bend testing. 5. High temperature testing. 6. Fatigue testing. 7. Fracture toughness testing. 8. Nondestructive testing. 9. Corrosion testing.	10			I. The student should understand the procedures for the most commonly used industrial testing methods.
II. Alloy Steels 1. Alloying elements in ferrous alloys. 2. Carbon steel. 3. Alloy steel.	6			II. The student should know the properties and uses of industrial steel and its alloys.
III. Nonferrous metals and alloys. 1. Aluminum and alloys. 2. Titanium and alloys. 3. Magnesium and alloys.	5			III. The student should know the properties, uses and machining techniques used with the commonly used nonferrous metals.

(USE ADDITIONAL PAGES IF NECESSARY)

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 211

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
III. 4. Copper and alloys. 5. Zinc and alloys 6. Nickel and alloys. 7. Precious metals.				
IV. Processing metals. 1. Foundry. 2. Casting. 3. Powdered Metalurgy.	5			IV. The student should understand the basic processes used in manufacturing metals, make casting and form parts, uses P.M. techniques.
V. Additional materials. 1. Ceramics. 2. Plastics and composite. 3. Elastomers and rubbers.	7			V. The student should understand the properties and industrial uses of ceramics and plastics.
VI. Heat treating of metal. 1. Heat treatment of steel. 2. Surface hardening of steel. 3. Heat treating furnaces.	6			VI. The student should understand the heat treating processes used in manufacturing steel parts.
VII. Adhesives 1. Theory of adhesives. 2. Epoxies. 3. Urethanes. 4. Cyanoacrylates. 5. Acrylics. 6. Anaerobics. 7. Hot melts.	6			VII. The student should understand the differences in composition and uses of the basic types of industrial adhesives.

__X__ REQUIRED COURSE

_____ ELECTIVE COURSE

_____ NEW COURSE 55

__X__ REVISED COURSE (Circle revised items.)

PARKLAND COLLEGE
COURSE INFORMATION FORM
(For use after August 1, 1988; discard all others)

COURSE PREFIX AND NUMBER MPT 212 TITLE Electromechanical Fabrication I (Motors)

CLASS HOURS 3 LABORATORY HOURS 5 CLINIC HOURS _____ CREDIT HOURS 5

COURSE PCS# _____ (Assigned by administration)

1. Catalog description of course including prerequisites and course fees (not more than 40 words).

   An introduction to fractional and subfractional horsepower electric motors. The fabrication of motor prototypes will stressed. Prerequisite: MPT 114 and ELT 171. Course Fee: $20.

2. The attached course outline must contain the following: general course objectives, textbook(s) and other required materials with approximate cost, required reading lists--when appropriate, required writing assignments--when appropriate, and laboratory information (e.g., topics covered)--when appropriate

3. Methods of evaluation (essay exams, objective exams, term papers, projects, etc.)
   Written examinations and laboratory projects.

4. Will additional and/or special equipment, library materials, supplies and/or facilities be needed or required? Please list and estimate cost.

5. What is your rationale or evidence of need for this course?

6. Are there any other Parkland courses that are similar in content? If yes, which ones? Yes. ELT 134. However, ELT 134 does not contain the fabrication aspect of MPT 212 and deals more with the industrial applications of larger motors.

7. For what programs would this course be supportive? Explain.
   Microprecision Technology core course

8. Does this course qualify as a general education course for any programs? Explain. No

PROPOSED BY _____ DATE 9/30/88

CURRICULUM CHAIRPERSON _____ DATE _____

DEPARTMENT CHAIRPERSON _____ DATE 9/30/88

VICE PRESIDENT FOR ACADEMIC ADMINISTRATION _____ DATE _____

APPROVAL: YES_____ NO _____

EFFECTIVE _____ 19 _____

PARKLAND COLLEGE

Provide the following information on how this course is being offered at other Illinois community colleges:

Name of community college (at least three)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks
NONE					

For baccalaureate-oriented courses, the following information is also needed:

Name of senior institution (at least 3)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 212

GENERAL COURSE OBJECTIVES: The student should develop an understanding of the construction, operation, classification and fabrication of small motors.

TEXTBOOK(s): Fractional and Subtractional Horsepower Electric Motors, $34.50.

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
I. General construction features of motors. 1. Bearings 2. Rotors 3. Stators 4. Starting Switches 5. Mountings and couplings 6. Thermal protectors 7. Gear motors	15			I. The student should understand the function of the basic components of small electric motors.
II. Motor selections 1. Applications 2. Electrical and mechanical considerations 3. Definite purpose motors	5			II. The student should know the important considerations when selecting a motor for a specific function.
III. Nameplate information	3	5		III. The student should be able to interpret the standard information on motor nameplates.

(USE ADDITIONAL PAGES IF NECESSARY)

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 212

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
IV. Types of motors 1. Induction motors 2. Single phase 3. Split-phase 4. Shaded-pole motors 5. Synchronous motors 6. Universal motors 7. DC motors 8. Stepper motors 9. Servo motors	12			IV. The student should understand the differences in the construction and operation of the major types of motors.
V. Motor fabrication 1. Drawing preparation 2. Housing 3. Rotor 4. Stators 5. Communtation and brushes 6. Testing	10	70		V. The students design and fabricate at least two types of miniature motors.

__X__ REQUIRED COURSE

_____ ELECTIVE COURSE

_____ NEW COURSE 59

__X__ REVISED COURSE (Circle revised items.)

PARKLAND COLLEGE
COURSE INFORMATION FORM
(For use after August 1, 1988; discard all others)

COURSE PREFIX AND NUMBER MPT 213 TITLE Electromechanical Fabrication II (Sensors and Tranducers)

CLASS HOURS 3 LABORATORY HOURS 5 CLINIC HOURS _____ CREDIT HOURS 5

COURSE PCS# _____ (Assigned by administration)

1. Catalog description of course including prerequisites and course fees (not more than 40 words).
   The principles of measuring temperature, pressure, level, flow, displacement, velocity and acceleration. The design and construction of miniature precision electromechanical instruments will be examined through prototype fabrication. Prerequisite: MPT 212, ELT 175 or concurrent enrollment and ELT 215 or concurrent enrollment. Course fee: $20.

2. The attached course outline must contain the following: general course objectives, textbook(s) and other required materials with approximate cost, required reading lists--when appropriate, required writing assignments--when appropriate, and laboratory information (e.g., topics covered)--when appropriate.

3. Methods of evaluation (essay exams, objective exams, term papers, projects, etc.)
   Written examinations and laboratory projects.

4. Will additional and/or special equipment, library materials, supplies and/or facilities be needed or required? Please list and estimate cost.
   No

5. What is your rationale or evidence of need for this course?
   Recommendations from advisory committee members and program graduates.

6. Are there any other Parkland courses that are similar in content? If yes, which ones?
   No

7. For what programs would this course be supportive? Explain.
   Microprecision Technology

8. Does this course qualify as a general education course for any programs? Explain.
   No

PROPOSED BY _____ DATE 9/30/88

CURRICULUM CHAIRPERSON _____ DATE _____

DEPARTMENT CHAIRPERSON _____ DATE 9/30/88

VICE PRESIDENT FOR ACADEMIC ADMINISTRATION _____ DATE _____

APPROVAL: YES _____ NO _____

EFFECTIVE _____ 19 _____

PARKLAND COLLEGE

Provide the following information on how this course is being offered at other Illinois community colleges:

Name of community college (at least three)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks
NONE					

For baccalaureate-oriented courses, the following information is also needed:

Name of senior institution (at least 3)	Course Number and Title	Semester Credit	Year of Catalog	Page Number	Remarks

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 213

GENERAL COURSE OBJECTIVES: The student should be familiar with a wide variety of sensors and understand their construction, function and application.

TEXTBOOK(s): TRANSDUCERS, SENSORS AND DETECTORS, $32.00

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
I. Sensor and/or transducer fabrication project 1. Introduction 2. Drawing preparation 3. Parts fabrication 4. Assemble and testing	10	75		I. The student will be able to design, fabricate, and test at least two types of sensors.
II. Introduction to sensors and transducers 1. Active elements 2. passive elements 3. Classification 4. Calibration	5			II. The student should be able to demonstrate an understanding of the terms sensor, transducer and detector. They should know the importance of sensors, transducers and detectors in industry as well as in consumer products.
III. Force transducers 1. Strain gauges 2. Load cells 3. Weigh cells	3			III. The student should understand the principles behind the construction and application of force transducers.

(USE AOOITIONAL PAGES IF NECESSARY)

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 213

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
IV. Vibration measurements 1. Acceleration 2. Displacement 3. Velocity	3			IV. The student should understand the principles behind the construction and application of devices that measure acceleration, displacement and velocity.
V. Solid state sensors 1. Crystals 2. Ceramics 3. Integration	4			V. The student should understand the principles involved in solid state sensors.
VI. Machine monitoring 1. Proximity sensors 2. Power sensing	4			VI. The student should be able to demonstrate and understand proximity and power sensors.
VII. Fluids 1. Flow sensing 2. Level sensing 3. Pressure sensing	6			VII. The student should understand the measurement options for measuring flow, level, pressure and temperature.
VIII. Temperature sensors 1. Thermocouples 2. Resistance temperature detector (RTD) 3. Thermistors 4. Other methods	2			

PARKLAND COLLEGE

COURSE PREFIX AND NUMBER MPT 213

MAJOR COURSE SEGMENTS	APPROXIMATE TIME (Hours per Segment) CLASS	LAB	CLINIC	LEARNING OUTCOMES
IX. Photodetection 1. Electromagnetic waves 2. Light reception 3. Applications	4			IX. The student should be able to demonstrate an understanding of the operating principles and use of photodetectors.
X. Meteorological Sensors 1. Wind speed and direction 2. Relative humidity 3. Barometric pressure 4. Rainfall transmitter	4			X. The student should be able to demonstrate an understanding of the types of instruments that measure meteorological variables.

APPENDIX C

MICROPRECISION FACT SHEET

FACT SHEET

MICROPRECISION TECHNOLOGY

DEFINITION

Microprecision technicians build and modify electronic and mechanical devices and help to develop complex instruments that sense, measure, and record changes in their environment. Examples of such instruments include altimeters, pressure gauges, and radiation devices. Other technicians test, install, repair, inspect, and maintain instruments and related apparatus. Other specific duties include verifying the dimensions and functions of devices assembled by other technicians and craft workers, planning test programs, and directing technical personnel in carrying out these tests.

APTITUDES RELATED TO MICROPRECISION TECHNOLOGY

Ability to move hands easily/skillfully.
Ability to understand the relationship between a three-dimensional object and a two-dimensional picture of it.

PHYSICAL DEMANDS

Light lifting (up to twenty pounds).
Involves ability to work under magnification.
Involves both standing and sitting fairly equally.

WORK ENVIRONMENT

Mostly inside.

WORK HOURS

Work customarily during weekdays.
35-40 hour work-week normal.
Occasional overtime.
Shift work usual.
occasional night work.
occasional weekend/holiday work.

WORK VALUES

Working with your hands.
Working with your mind.
Variety or routine.

WORK TEMPERAMENTS

A calm, well-controlled approach to work is essential.
Requires ability to visualize functions or malfunctions of various mechanisms.
Work situation involves the precise attainment of set limits, tolerances, or standards.
Work situation involves evaluation of information against measurable or verifiable criteria.

VOCATIONAL PREPARATION: EDUCATION AND TRAINING

School courses should include math, physics, electronics, and machine shop.
High school education or equivalent, plus additional postsecondary training.
Training is through technical schools, colleges (2 year), apprenticeships, and military service.
On-the-job training is also provided.

SALARIES

At entry-level, Parkland Microprecision graduates' salaries generally range from $16,000 to $22,000 (and may be as high as $28,000).

EMPLOYMENT

Recent graduates of Parkland's Microprecision Technology program have secured employment locally, in Northern Illinois, in the Great Lakes region, and on the East and West Coasts. Employers are typically manufacturing firms; examples of their products are: sensing devices; computer disks; audio and video recording equipment; robotics; automotive and aviation components; small appliances; hearing aids; analytical devices. Some microprecision technicians are involved in research and precision machining work.

INTEREST AREAS

Realistic, investigative, and conventional abilities.
Mechanical, scientific, industrial.
Activities dealing with things and objects.
Activities in relation to processes, machines, techniques.
Activities resulting in tangible, productive satisfaction.

ADVANCEMENT

Most technicians begin employment as manufacturing/testing or research/development technicians. They may advance to senior technicians or entry-level engineering positions.

EMPLOYMENT OUTLOOK

Employment opportunities are expected to be favorable through the year 2000. Opportunities will be best for graduates of postsecondary technical training programs. As instrumentation continues to expand and the need for skilled technicians increases, the shortage of qualified instructors will become more acute. Thus, it is expected that there will be an increased need for microprecision technicians and instructors in the future. In summary, employment potential is excellent.

DOT CODE: 710.281-030, 710.281-010, 710.281-014, 003.261-010
STANDARD OCCUPATION CLASSIFICATION: 6171
HOLLAND CODE: REI, RIE, RIC

APPENDIX D

MICROPRECISION PLACEMENT LIST AND MAPS

MICROPRECISION TECHNOLOGY

GRADUATES HAVE BEEN EMPLOYED

BY THE FOLLOWING COMPANIES

	Company	Product
1.	Motorola, Inc. Corporate R. & D Center Schaumburg, IL	Small Appliances
2.	Schaevitz Engineering Pennsauken, NJ	Recording and Controlling Devices for Industry
3.	IBM Raleigh, NC	Robotics Division
4.	Sandia National Laboratories Albuquerque, NM	Research
5.	Boeing Aerospace Seattle, WA	Aerospace Equipment
6.	Borg Instrument Corp. Delavan, WI	Automotive Instruments
7.	Wilbrecht Electronics St. Paul, MN	Hearing Aids
8.	Dwyer Instruments Michigan City, IN	Low Pressure Controls Gages & Flowmeters
9.	Clifton Precision Davenport, IA	Aviation Information
10.	Bendix Corp. South Bend, IN	Automotive Products
11.	Druck Inc. Danbury, CT	Pressure Sensing Device
12.	Honeywell, Inc. Space and Strategic Avionics Div. Clearwater, FL	Guidance Systems

	Company	Product
13.	Kistler Instrument Corp. Amherst, NY	Pressure Sensing Devices
14.	Omega Engineering Stamford, CT	Temperature Sensors
15.	King Arthur Clock & Jewelry Plano, TX	Clock Sales and Repair
16.	Electronic Decisions Inc. Urbana, IL	Solid State Devices
17.	Rhino Robots Inc. Champaign, IL	Educational Robots
18.	SLM Instruments Inc. Urbana, IL	Analytical Instruments Spectrofluorometers
19.	Frasca Aviation Inc. Champaign, IL	Pilot Ground Instrument Trainers
20.	Precision Products Davidson, NC	Timekeeping Devices
21.	Micro Switch Freeport, IL	Sensors and Switches
22.	Mason & Sullivan West Yarmouth, MA	Clock Repair Clock Kits
23.	Ampex Corp. Redwood City, CA	Audio & Video Recording Equipment
24.	MPC Products Corp. Skokie, IL	Micro Motor For Aviation and Aerospace
25.	Spin Physics Inc. San Diego, CA	Magnetic Recording Devices
26.	Clock Shop of Virginia Charlottesville, VA	Clock Repair and Making
27.	Paul's Machine Shop Villa Grove, IL	Micro-Precision Machining
28.	University of Illinois Champaign, IL	Instrument Service

	Company	Product
29.	Micro Mo., Inc. St. Petersburg, FL	Miniature Motors and Gear Heads
30.	Archive Corp. Costa Mesa, CA	Cartridge Tape Drives
31.	Venture Precision Savoy, IL	Precision Machining, Prototype Construction
32.	C.T.S. Corp. Elkhart, IN	Electronic Sensors (Automotive)
33.	Xidex Corp. Santa Clara, CA	Computer Disks, Readers, Printers and Drives
34.	Biotronics, Inc. Bend, OR	Bio-sensors


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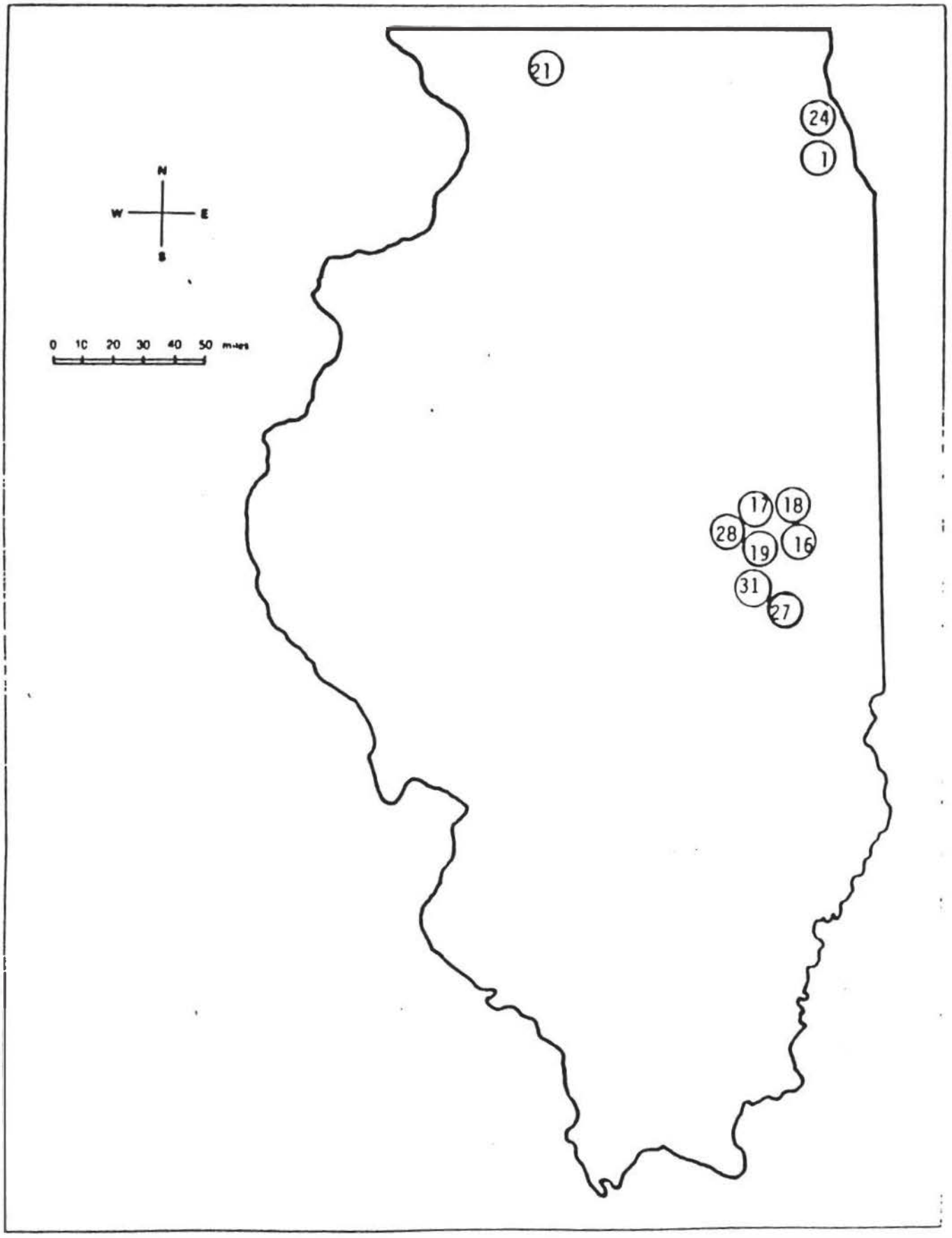

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