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ABSTRACT

The purpose of this study was to develop a computerized program to assist students and their faculty advisors in the initial planning and the on-going evaluation of their academic course of study. The system was conceptualized as an interacting process which would compare the student's proposed academic program with a data bank of information containing all the possible ways in which a student could satisfy the graduation requirements of the university. Based on the experiences of the last three years, Computer Assisted Academic Advisement and Planning is feasible. A pilot sample of 25 student records was processed through the completed system. All aspects (data collection, software procedures, computer operations, output, and student-faculty utilization) were found to be highly satisfactory, including the projected cost which, excluding updating and maintenance, was kept under one dollar per record. (Author/PC)

CAAAP(Computer Assisted Academic Advisement and Planning): A Feasibility Study*

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INTRODUCTION

A nearly universal problem of both university students and their faculty advisors is one of academic planning and evaluation of a student's course-of-study. The process, at best, is often inefficient and at times not very effective. The nature of the university catalog, constantly being revised and containing a complex combination of ways in which students can satisfy their graduation requirements, many times leads to the frustration of both parties (student and advisor).

One example should make clear the possibilities that might arise to cause such confusion. One of four areas within the Required General Education Program from which a student must select a designated number of hours is the humanities division. The students must select fifteen (15) semester hours from the over 60 classes listed under the eight (8) different departments of History, English, Philosophy, Foreign Language, Art, Music, or Speech which comprise the humanities division; however, the decisions in just this one area do not stop here. A student must include classes from at least three (3) different departments out of the eight (8) listed, and must not count classes which might be used in his major or minor. Multiply such a dilemma several times and the potential for confusion is evident.

The author has had some experiences with computer programming and applications. However, it was given from the onset that he would have neither the expertise nor the inclination to undertake the technical aspects of the project. He did establish the task and enlisted experts to develop the tools to accomplish it. He also provided the leadership and supervision for the project. The report that follows does not present an answer to anyone's problems; in fact, it has left the developer with many unresolved problems (priorities that have kept us from fully operationalizing what we developed to this point). It can share philosophical positions, goals, and technical knowledge that can be adapted and utilized by others.

The report will be presented in three portions:

I Project Description
II Documentation
III Conclusions.

I. PROJECT DESCRIPTION

PURPOSE

The purpose of this study was to develop a computerized program to assist students and their faculty advisors in the initial planning and the on-going evaluation of their academic course-of-study. The proposed computer assisted program was designed to serve the students and faculty of the Department of Physical Education for Men, Northern Illinois University.

PROBLEMS

Several problems were investigated in order to develop the computer assisted academic advisement and planning program. Specifically these problems included:

1. To assemble all of the necessary material, in a usable form, to determine the numerous ways in which a student majoring in Physical Education can meet the criteria established by the university for graduation. The criteria were those stated in the 1972-73 Northern Illinois University Catalog. The resulting form was used as the format for the print-out to be supplied by the computer once the program is operational.
2. To develop a preliminary flow-chart describing how the suggested CAAAP (Computer Assisted Academic Advisement and Planning) program for Physical Education majors at Northern Illinois University would be made operational.
3. To prepare a computer program to handle the necessary evaluative procedure.

JUSTIFICATION OF THE STUDY

The introduction of the computer into the traditional student and teacher task of academic advisement and evaluation offers several advantages to both parties. One of the prime advantages is the probability that a vast number of man hours that have been used for purely mechanical checking and rechecking could be saved and be put to better use elsewhere. This is not to imply a loss of contact between the teacher and the student, on the contrary, it will result in additional time being made available for them to engage in more meaningful activities. It does not by any means relieve the team of the responsibility of, and the educational benefits afforded by, the careful and thoughtful planning of the students academic course-of-study. It should, however, relieve some tension from the undertaking and may even make the task a pleasant and educational one. Miller (1) in an article written to school administrators sums up a rationale for the use of the computer in educational tasks:

> The basic premise in applying data processing procedures to testing activities is that machines should be used in areas where they are capable of doing impersonal tasks more efficiently and accurately than teachers or clerical assistants can do them. One of the primary objectves of a data processing department must be to relieve teachers of routine clerical duties and to permit more emphasis on the teachers primary function, the close personal interaction between themselves and students.

An additional advantage to be considered would be the relative ease with which such a computer assisted process, once it was operational, could be adapted to serve students and faculties of different departments at Northern Illinois University and even of different universities or colleges.

Finally, if a trend away from mandatory advisement of a students academic programs by faculty members occurs (such is the case at the author's university) the program would be available to the student for self-help in his planning.

An important step in the justification of a proposed project is to try to get estimates as to the feasibility of such an undertaking and its usefulness should you be successful. In order to get some idea as to problems involved in the program design the author obtained the advice of several individuals who were experts in various areas of Computer Sciences. Based on their evaluation of the proposed project, it is concluded that it is worthwhile to investigate the necessary computer assisted functions of the project(2).

The check on the useability of the proposed advisement system the administrators responsibile to the Physical Education Majors program were interviewed. It was their opinion that if a system were workable, from a technical standpoint, it would very definitely be useable by the department(3).

REVIEW OF THE LITERATURE

A review of any index containing implications for education clearly shows the many opportunities for incorporating the computer into an assisting role in virtually every area of education and has been extensively documented in the literature of the last decade.

It has been suggested that computers have a valuable role to play in five general divisions of the education process. These functions include (1) students, (2) staff, (3) facilities, (4) curriculum, and (5) finance(4). Application of three of these areas are particularly important in the proposed CAAAP proposal. Caaap will make definite contributions to the student, staff, and curriculum functions and to a lesser degree to the facilities and finance areas.

Suppes and Jerman (5) argue that CAI (Computer Assisted Instruction) is no longer a question of whether it will play an increasing role in education but rather, when will CAI begin to play a more prominent role? Computer technology has increased since its first commercial application in the Census Bureau in 1951(6). The involvement of the government in computer assisted

educational tasks has continued up to the present time primarily through the funding of various projects. It appears that this trend will continue for the next several years; however, the success of CAI in an operational sense depends upon developmental efforts becoming part of local and state school budgets(7).

Walton, in an article written to point out the use of computers to the classroom teacher, lists the tasks now being done by the computer:

Keeping student records
Copying student transcripts
Maintaining student registers
Scoring objective tests
Doing administrative reports
Computing grade point averages and figuring rank-in-class
Writing personalized letters to parents
Retrieving library information (8)

and asks, "how many of them are on your list of unpleasant chores?" The article contains several other lists: (1) combinations of various instructional applications (i.e. as a monitor of an individual student's learning progress), (2) unconventional education tasks (i.e. a coach in perfecting pronunciation and enunciation) and finally (3) an important summary list of what is being learned from experimentation with computers in education. The list reads:

- There are marginal learners who are making progress-slow but steady progress
- Attention spans are noticeably increased
- Instructions are followed with greater facilities
- Judgements, decisions and other higher level thought processes are completed within briefer time limits
- Frustrations experienced by the learner in difficulty are observably relaxed (9).

An article by Mitchell(10) will be used to illustrate the possibilities, in an operational sense, of how one might apply the computer for a joint educational effort between scholar, researcher, teacher, and student. The task was one of compiling an enormous international bibliography, produced annually by the Modern Language Association, to be utilized by vast numbers of individuals in English Related fields. The solution presented documents the possibilities of utilizing the computer to undertake long and boring tasks with accuracy and speed, once the procedure (program) for handling the undertaking has been defined for the computer. The end result was a bibliography produced in a fraction of the time, more accurately compiled than ever

before, and utilizing experts from many different fields. The result was a document in the hands of those who could benefit from it because of its current nature, useable format, and accurate information.

Finally, an article outlining the general implicatons for the computer in higher education by Caffrey (11),also co-author of Computers on Computers is included to illustrate some of the administrative considerations. The computer acts as a threat to most school administrators for several reasons. First, the majority do not know enough about the subject to make intelligent decisions about their use on campus. Computers are a serious piece of machinery which come in all sorts of shapes and sizes, they are very expensive and they are coming on the campus. He goes on to point out that less than half of the American Colleges and Universities have a computer and of those who do some are spending $3.5 million to $7 million a year for computer rentals. "The point is that the Administration which makes the rules, which determines how the institution is to be run,....must tell the computer programmer how it wants the computer to be used in administration(12)."

The second, or opposition position, for administrators to consider is what Caffrey calls the "computer imperative." This is the imperative which requires that you know exactly what can and what cannot be accomplished with the computer on campus. He concludes:

> ...when this generation of graduate students begins to hit the ranks of the faculty? I think we will see a tremendous change, not only in the acceptability of automation; we will see inevitability dramatized dramatically.

The computer is not just coming. It is on the campus. We all must face up to it(13).

This selected review of literature is not meant to be exhaustive. It is, however, designed to give an overview of representative material available on the theoretical and operational opportunities of involving the computer in educational processes. It has been shown that the computer has, is, and will be, utilized by administrators, faculty, staff, and students for numerous tasks, including tutorial, evaluative, clerical, financial, projective planning, curricular, and on and on.

A review of the literature clearly demonstrates, when one observes and reads what is being done and what is projected by experts in the field, that a project utilizing a computer to assit in the advisdment of students in planning and evaluating their academic course-of-study is clearly feasible.

PROCEDURE

Permanent Data Bank. The establishment of the permanently stored data bank of information to which the students proposed academic course-of-study would be compared, required several steps. First, a copy of thE official document used by the University to produce a student's statement of standing was utilized as a basis for the data bank. This form WAS supplemented with a listing of the required and elective classes for a physical education major. A space on the form for the students selected minor would also be used. It was necessary to make a listing of all the minors available within the university and their requirements to provide the data for comparisons against those minors which might be selected by the Physical Education major.

A secondary advantage of compiling this information into a one page short-form is that it would provide a very useful format for the computer generated print-out of information to follow regarding the student's course-of-study.

Theoretical Construct. The theoretical model of such a system would, in very general terms, be an interacting process which would compare the student's proposed academic program with a data bank of information containing all the possible ways in which a student could satisfy the graduation requirements of the university.

There were three tasks which were undertaken. First, was the establishment of a data bank of information containing all the necessary catalog information from which the comparison of the student's academic program can be made. In operation, this would mean a data bank containing the majority of the information in the universities catalog. Such material as campus descriptions of facilities, staff, and equipment, calendar informaton, course descriptions, and so on were eliminated. It was necessary, however, to include all the general education requirements, all the Physical Education major requirements, and all the possible minor programs (aproximately 75) a student might select, and all of the requirements regarding specific grade point averages &nd other special requirements imposed by his select academic program. After several months of trying to identify a method for accomplishing the tremendous task the Computer Services Department decided to create a master curriculum file. This file contained all of the information the proposed program required. All that was necessary was to modify it to suit a new need.

The second general portion of the system would be the input of the academic course-of-study that was planned by the student and his advisor. This segment of the system will be compared with the previously mentioned large data bank of university requirements. The initial portion would include an evaluation of how well the student has satisfied the general education

requirements of the university. This would involve the cross-check of whether or not he has satisfied:

(1) the sixteen semester hours of specified classes required of all students,

(2) the humanities requirement of sixteen semester hours from the list of appropriate electives and that these hours come from three different departments,

(3) the science and mathematics requirements of eight semester hours in a laboratory sequence or eight to nine hours in three departments from the classes listed,

(4) the social science requirement of nine hours in two departments from the classes listed,

(5) the Senate Bill 195 requirement (pass a proficiency exam on the constitution or pass the class Political Science 140),

(6) the required 28 semester hours required of all physical education majors, and the appropriate number of classes from the elective categories which combined total a minumum of forty semester hours,

(7) the required and elective classes to fulfill the students selected minor,

(8) the twenty-one hours of education classes required if he has elected the Bachelor of Science in Education program,

(9) the requirement of having fourty semester hours of senior college credit (courses numbered 300-499) and

(10) the requirement of having earned a minimum of 124 semester hours.

The third portion of the model was a program designed to instruct the computer to compare the stored data bank of university requirements and all the possibilities available to satisfy them with the student's proposed course-of-study. As the computer compares each of the ten general areas and their requirements (previously listed) it produced a printed list of each area. The list would state whether or not the requirements in each area were fulfilled, and if not, produced a print-out of the deficiencies and informed the student and the advisor of all the possibilities available to them to satisfy each.

The task of developing or adapting a program to carry-out the tasks of such a proposal was designed by a computer programming specialist. The expertise required for such an undertaking was extremely demanding and much of the success of getting the proposal operational was, in fact, the accuracy and useability of the computer program. The development and design was guided by, and required to meet the specifications of this proposal.

The system also included a process for checking each class in the proposed course-of-study to determine whether or not it required a prerequisite. If a prerequisite was required the computer would search through the classes to see if it preceded that class being checked, if not, a print-out of the class and the prerequisite class was produced.

Based on the review of the literature, the personal interviews with advisement and computer experts in the areas under consideration and the personal research conducted on the proposal, it is concluded that the proposed CAAAP (Computer Assisted Academic Advisement and Planning) project was a feasible undertaking. The following material will present the documentation developed by the computer programmer to support the program.

II. DOCUMENTATION

The capability of this system is limited to processing Physical Education Majors, Minors, and general education requirements from the 1972-73 Northern Illinois University Catalog. The output consists of a list of courses necessary to graduate in the fields of Physical Education for Men and General Education. All the programming, however, has been completed to handle any major or minor within the 1972-73 catalog.

Major and minor data tables are easily constructed, such construction will be at the expense of any department that wishes to utilize this package (to construct the tables please see page 13). The more departments that become involved with this package, the more complete will be the data base. If we could achieve 100% departmental participation, all students under the 1972-73 catalog could be processed. But this also seems to be very limited in that it covers only 25% of the NIU populaton. This problem can be solved in four steps:

1) Add a new field to the student record that would indicate under which catalog the student is to graduate.
2) A simple programming change could be made to test the student record for the catalog type.
3) Add three new master files, one for each year.
4) Add three new major-minor data table files, one for each catalog.

With these changes, we can process almost the entire student body with few exceptions. To make these modificatons, please see 'Future Changes'(page 10). Ultimately, this package could become an integral part of a student information system with dynamic updating of the student file through registration.

GENERAL DESCRIPTION OF PROGRAMS

There are three programs involved and they have been called CAAAP001, CAAAP002 and CAAAP003.

CAAAP creates a sequential file which is an abstract of a tape file that was obtained from registration, (see previous discussion), that is a complete list of all courses offered at NIU. The abstract file contains information necessary for this

system. See File Description 1 for file description, A, B, and C records. This file is used in creating:

1. A readable catalogue of courses and their sequence number.
2. A BDAM (basic direct access method) file which will be used throughout the rest of the system.

This BDAM file is created by using CAAAP002. The BDAM access method was chosen over all other access methods only after extensive research and experimentation. BDAM is a difficult method from the programmers standpoint, but was found to be the fastest and therefore least costly.

CAAAP003 is the workhorse. It reads all files, creates internal data structures, does all file searching and computations, and then prints the end results.

There are four files involved:

1. The master file which is the BDAM file discussed earlier.

2. A file of all majors, minors, and General Education areas and the requirements of each.

3. A file of Majors and Minors with their course title. This file is used to print the title of the major or minor on the report. If a major or minor is not in this list and is called for at execution time, the Major or Minor code will be printed along with 'unlisted'.

4. This final file is the student information file with name, identification number, address, major minor, and all courses taken to date. As a note, this system can handle up to 7 majors and/or minors per student.

For further documentation, please see Appendix D, Detailed Breakdowns, for a complete program flowchart.

RUN ORDER

CAAAP001 and CAAAP002 have been combined and can be run as a single program for the facility of the user. This program will be referred to as CAAAP001&002.

CAAAP001&002 is run once per year. CAAAP003 can be run immediately following the completion of CAAAP001&002 and can be run as many times as desired. If multiple runs are required, it is desirable to wait for the completion of one before submitting another.

To Run CAAAP001&002

Input is a tape file created by registration that is a complete list of courses offered at N.I.U. This information is to be changed into card and included in CAAAP001&002. After these changes are made the program may be submitted. Output will be an abstract of the input file with BDAM organization and a printed list of this file.

To Run CAAAP003

Before running CAAAP003 the student data file must be constructed,

To do this, please see 'Data Construction - Student File' (Page 13). After this is done, merely place the data between cards 7 and 8 and submit the deck for execution.

Data Errors

In all data errors, a message will be printed as to the nature of the error. In the case of a data error on a student record, the program will try to continue processing by skipping to the next student record. To correct a student record data error, the user must take action specified by the error message, it will be necessary to make another run with only the corrected student records. If the error is not a student error, the program will abend with a dump. This is a programmer's problem and all output is to be given to him.

FUTURE CHANGES

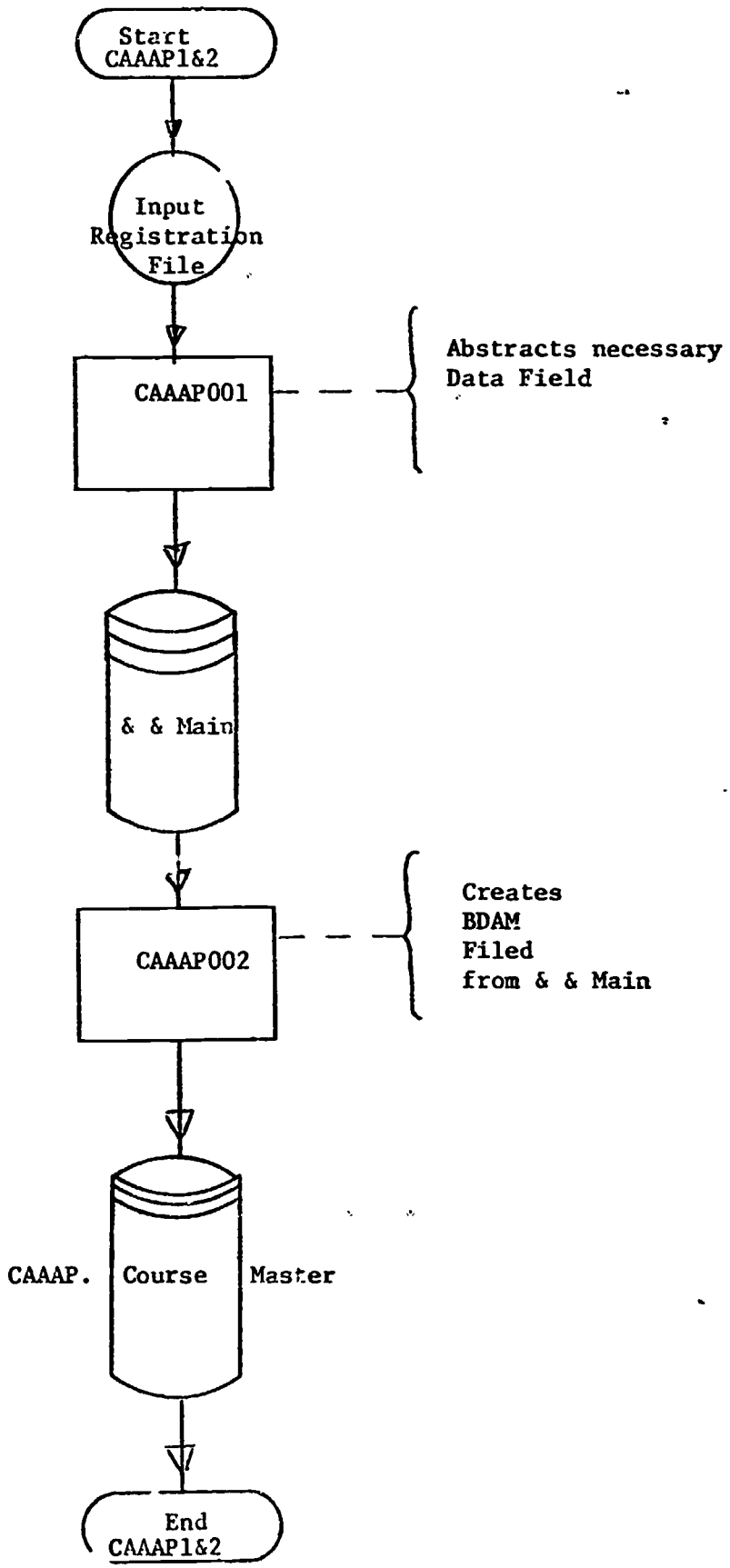
To add a Major or Minor to the data base it is recommended that one review 'Major and Minor Data Table' under 'Data Construction'.

It is important to remember that each department can offer more than one major. For example, Physical Education for Men offers two:

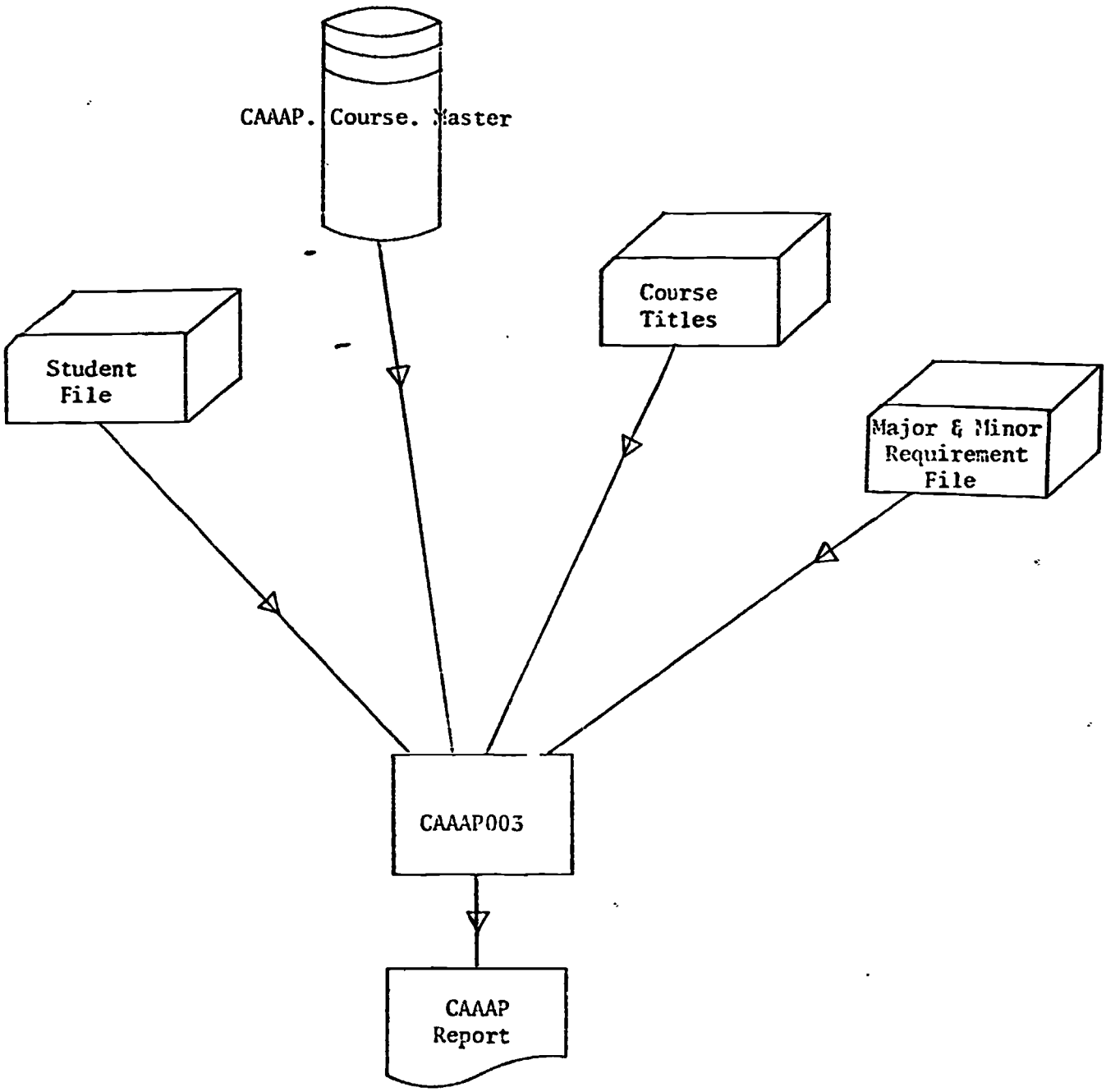
1) Bachelor of Science in Education
2) Bachelor of Science

Each of these has a distinct requirement list. Although some courses may be common to both majors, the two majors must be treated as separate entities. We therefore must have a separate 'Major Header Record' for each. Under each 'Major Header Record' we will have one or more Subgroup Header Records. For example, Bachelor of Science in Education would have three subgroups. (See Appendix D, Detailed breakdowns, for Major Requirements.) Example 1 would have a Type code of '1111'. Both example 2 and 3 would have a type code of '2222'. Care must be taken with

Flow Chart of File usage and creation for CAAAP1&2



File Usage and Creation for CAAAP003



example 2 to insure proper calculation using this subcode. The Bachelor of Science would also need three subgroups. They would consist of Examples 1, 4, and 5, all of which would have a type code of '1111'. A special case will exemplify the use of subgroup type '8500' (please see Appendix D, Detailed Breakdowns, Graduation Requirements). Any one of the laboratory sequences, marked 6.1 through 6.7 can satisfy this requirement or also nine hours listed under survey courses distributed among three departments can satisfy the same requirements. This means we have a total of nine subgroup headers for this section; one for each laboratory sequence and one for the survey courses option. All of these subgroups would have a type code of '8500'. Please turn to Appendices A, B, C for a complete illustration of the coding for Physical Educaton and General Education. After a major or minor has been added to the data base, a new record must be added to the title file for that major. Also, add the major or minor code to the list of major and minor codes to keep this list current.

DATA CONSTRUCTION

Major and Minor Data Tables

There are three types of records. These records will be refered to as:

1) Major Header
2) Subgroup Header
3) Course List

For convenience, please refer to Multiple-card Layout Form 1, Card Punching or Verifying Instructions 1, 2, 3, in Appendix D.

Major Header.

The Major Header consists of two entries. The first is type identification. For the Major Header this is always coded '9999'. The second entry is the major or minor code. This entry has eight positions. For the first position use the proper college code. A complete list of these codes are supplied under 'College Codes'. The next four positions are to be filled with the department code. Again these codes are supplied under 'Department Codes'. The final three positions are to be filled with a number unique to that department. To be certain that it is unique, double check with the current list of major and minor codes.

Subgroup Header.

The Subgroup Header consists of five entries. These entries vary depending on the type of the subgroup. There are presently three types of Subgroups.

a) The first Subgroup uses three out of the five entries. The first entry is the type. For this Subgroup, the type is always '1111'. The second entry contains the total number of courses in that Subgroup. The third entry contains the total number of hours, in (3,1) format, needed out of this Subgroup to satisfy the requirements. The last two positions are not used and should be zero filled. This Subgroup type is used to classify the group of courses under this term:

'X' number of courses needed out of the following list.

b) The second Subgroup uses all five entries. The first entry is the type. For this Subgroup the type is always '2222'. The second entry contains the total number of courses in that Subgroup. The third entry contains the total number of hours, in (3,1) format, needed out of this Subgroup to satisfy the requirements. The fourth entry contains the number of courses that are in a special group of courses that lead to this Subgroup. The fifth entry contains the number of hours in (3,1) format that must be taken in special group of courses. This group is used when you can classify the group of courses under this term:

'X' number of hours are needed of which 'A' number of hours must be taken from the first 'B' number of courses.

C) The third subgroup uses four of the five entries. The first entry is the Subgroup type. For this Subgroup it is always coded '8500'. The second entry contains the total number of courses in that Subgroup. The third entry contains the total number of hours, in (3,1) Format, needed out of this Subgroup to satisfy the requirements. The fourth entry contains the number of departments in that at least one course must be taken to satisfy the requirements. The fifth entry is not used and should be zero filled. This Subgroup is used when you classify the group of courses under this term;

'X' number of hours are needed in 'A' number of departments out of the following list.

or

'X' number of hours are needed in 'A' number of departments out of the following list.

etc.

Course List.

The course list record contains eight entries. Each entry is the sequence number of a course. These sequence numbers are to be taken from the 'Catalog of Courses' which is the output list of courses from CAAAP001&002; it is not important to fill each record with eight entries, but it is important not to have imbedded blanks.

DATA CONSTRUCTION

Student File

There are four types of records for each student file. Please refer to Multiple Lay-out Form 2, and Card punching or Verifying Instruction 4 through 9.

The first is the name card. All this card contains is the students full name, his (her) social security number and a card code of '01'.

The second is the address card. This contains the full mailing address of the student, his (her) social security number and a card code of '02'.

The third is the major card. This contains all the majors and minors a student is carrying (up to a maximum of seven), the student social security number and a card code of '03'.

The fourth is the course card. This can contain up to seven course sequence numbers of courses that the student has taken, the student social security number and a card code of '04'.

DATA CONSTRUCTION

Title File

There is only one type of record in this file. For the exact card format please refer to Multiple Lay-out Form 3, Card Punching or Verifying Instructions 10.

There are two entries in this record. The first is the major or minor code found in the 'Major Header Record' under 'Major and Minor Data Tables'. The second entry is the title description of the major or minor.

III. CONCLUSION

Based upon the experiences of the last three years, Computer Assisted Academic Advisement and Planning is feasible. A pilot-sample of twenty-five student records were processed through the completed system. All aspects (data collection, soft-ware procedures, computer operations, output, and student-faculty utilization) were found to be highly satisfactory. Even the projected cost, excluding updating and maintainence, were kept under one dollar per record.

Northern Illinois University does not have this program on line at the present time. The difficulties are ones of priority. Computer services are provided on the basis of these priorities and this project could not be given the necessary manpower/financial support it needed to be operationalized at this time. The issues encountered were: (1) most curriculums within the university are in a constant state of flux, (2) students are given the right to choose between and among various Catalogs of different vintages and requirements, (3) leadership, supervision, and programming personnel already have existing responsibilities, and (4) the program would require almost full time attention of programming personel for updating and maintainance. It may be that this program has more potiential for institutions that have curricula that are more static, possibly medical and law schools.

The author does not agree with all of the priorities that impinged on this program; however, considerable thought has been given to these matters by the university at large and are at the moment the criteria used to make such judgements. This is a good condition. Individuals may not agree with certain issues, but it serves as an excellent illustration that philosophical, and administrative factors must be considered along with the effectiveness and efficiency of the computer operations. Computers in educational settings must contribute to the task of education--facilitating teaching and learning. CAAAP possesses such potential.

APPENDIX A

Major and Minor Codes

LIST OF MAJOR AND MINOR CODES

2PE-M000	P.E. in Education
2PE-M001	P.E. Bachelor of Science
2PE-M005	P.E. Minor in Education
2PE-M006	P.E. Minor Bachelor of Science or Art
OGNED000	General Education

APPENDIX B

Department Codes

BUSINESS

Accountancy - ACCY
Business Education - BUSE
Finance - FINA
Management - MGMT
Marketing - MKTG

EDUCATION

Education - EDUC
Nursing - NURS
Outdoor Teachers Education - OTED
Physical Education-Men - PE-M
Physical Education-Women - PE-W
Special Education - SPED

FINE AND APPLIED ARTS

Art - ART
Home Economics - HMEC
Interdisciplinary - IDSP
Industry and Technology - IN&T
Music - MUSIC

SPEECH

Speech Communications -SP-C
Speech Pathology and Audiology - SP-P
Speech Theatre - SP-T
Military Sciences - MILS

LIBERAL ARTS & SCIENCES

Anthropology - ANTH
Biology - BIOS
Chemistry - CHEM
Economics - ECON
English - ENGL

FOREIGN LANGUAGES

Japanese - FL-A
Swahili - FL-A
Arabic - FL-A
Chinese - FL-A
Latin - FL-C
Greek - FL-C
French - FL-F
German - FL-G
Italian - FL-I
Malay - FL-M
Portuguese - FL-P
Russian - FL-R
Spanish - FL-S
Thai - FL-T
Indonesian - FL-IN

Geography - GEOG
Geology - GEOL
Journalism - JOUR
Library Science - LIBS
Mathematics - MATH
Philosophy - PHIL
Physics - PHYS
Political Science - POLS

Psychology - PSYC
Sociology - SOCI

APPENDIX C

College Codes

Business - 1

Education - 2

Fine and Applied Arts - 3

Liberal Arts and Sciences - 4

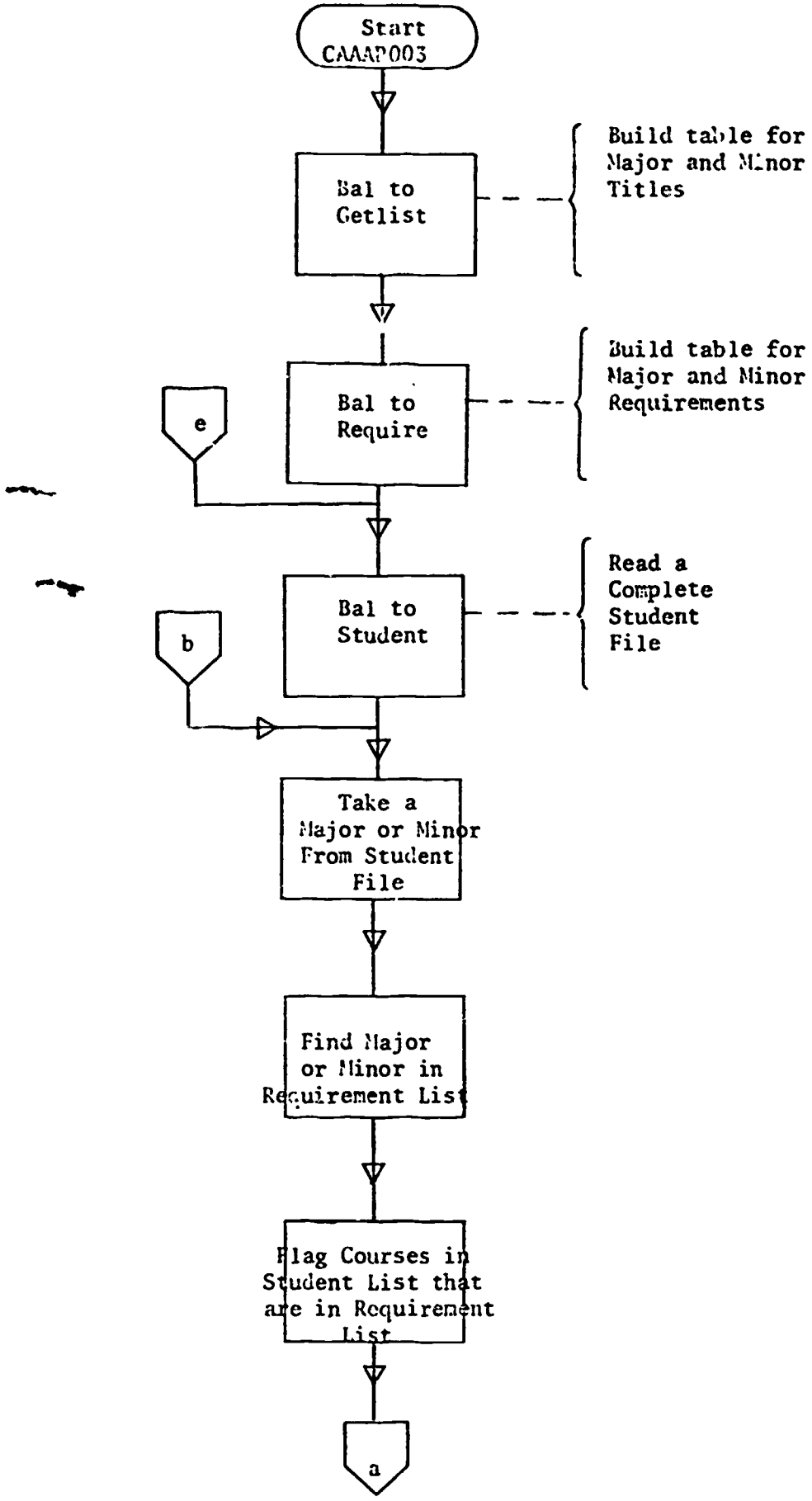
Military Sciences - 8

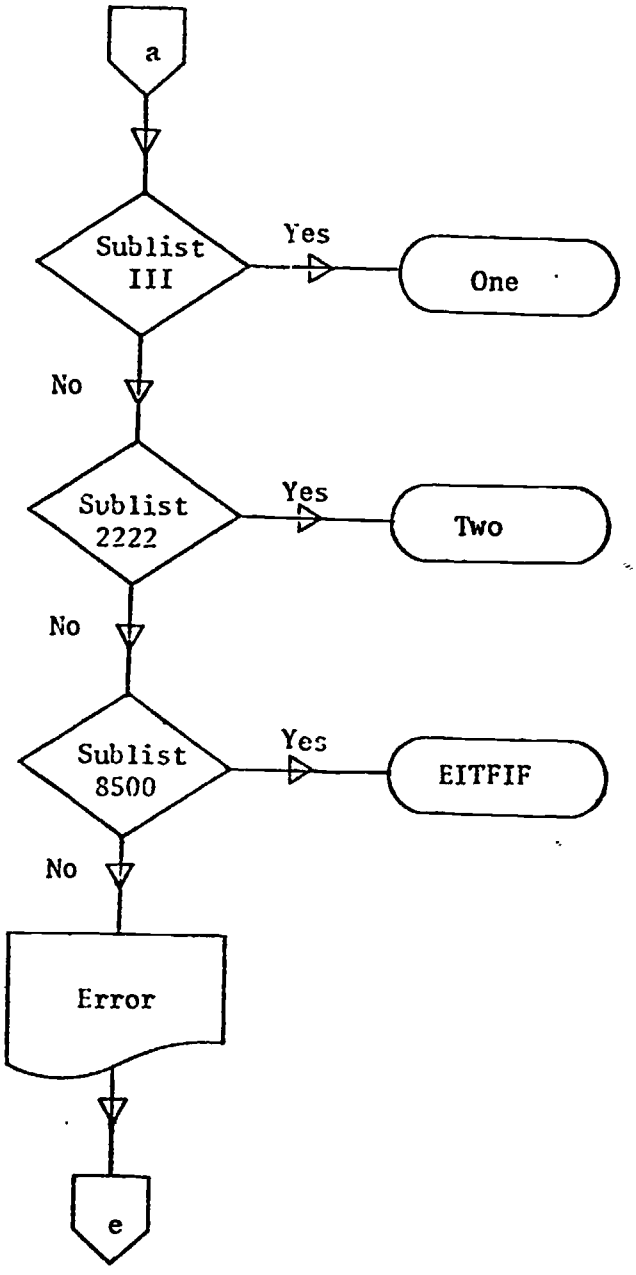
Interdisciplinary - 9

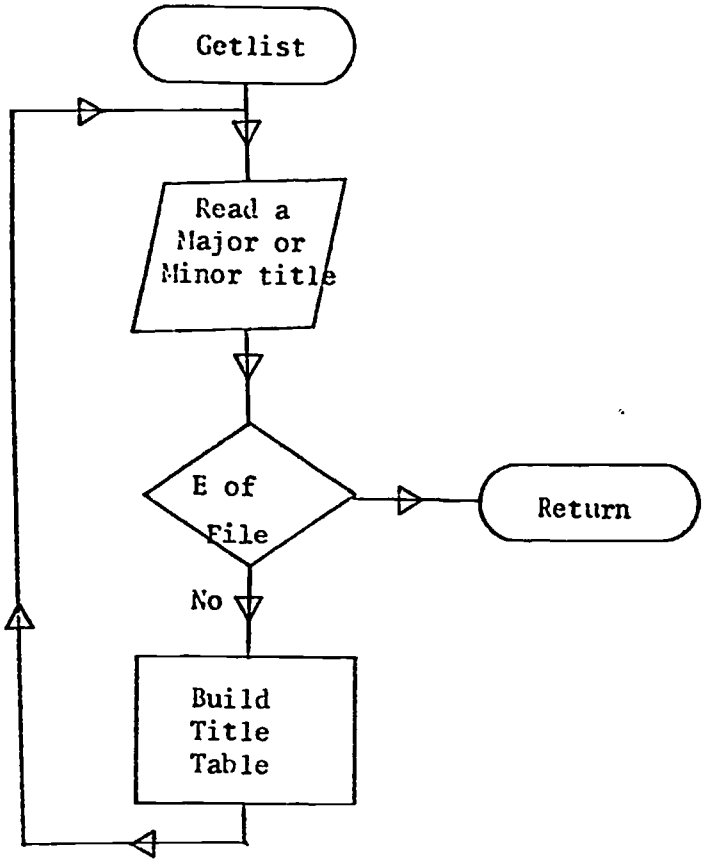
APPENDIX D

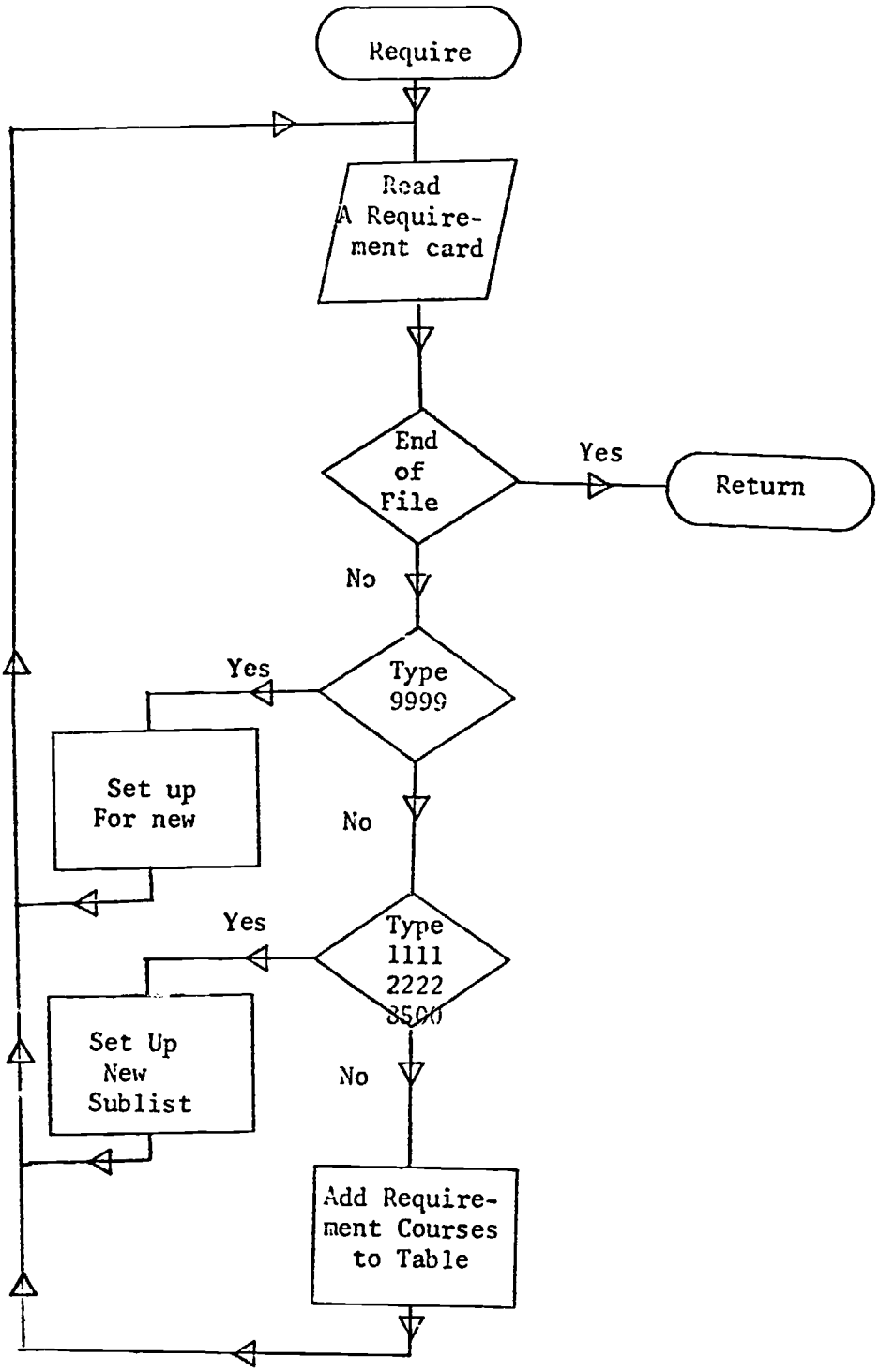
Detailed Breakdowns

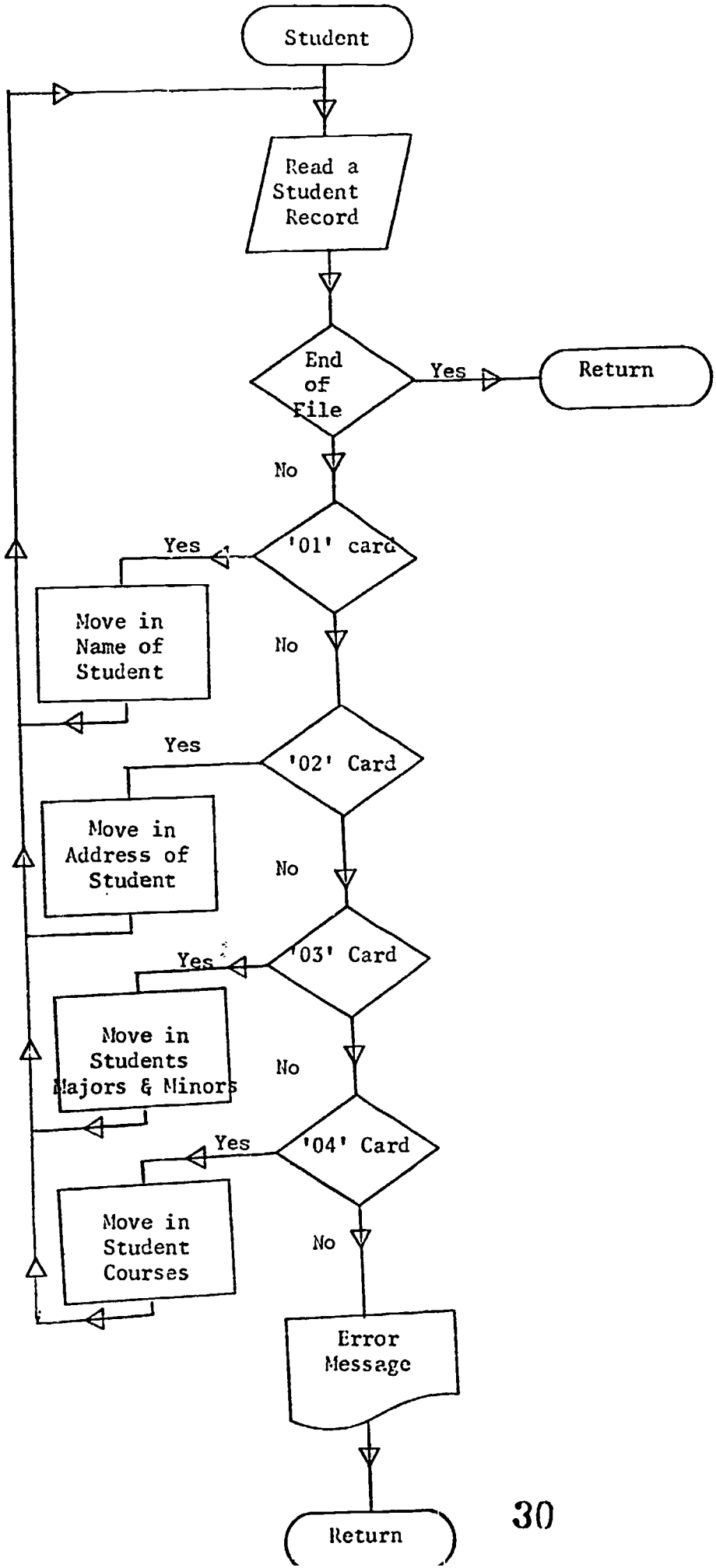
General Flow Chart

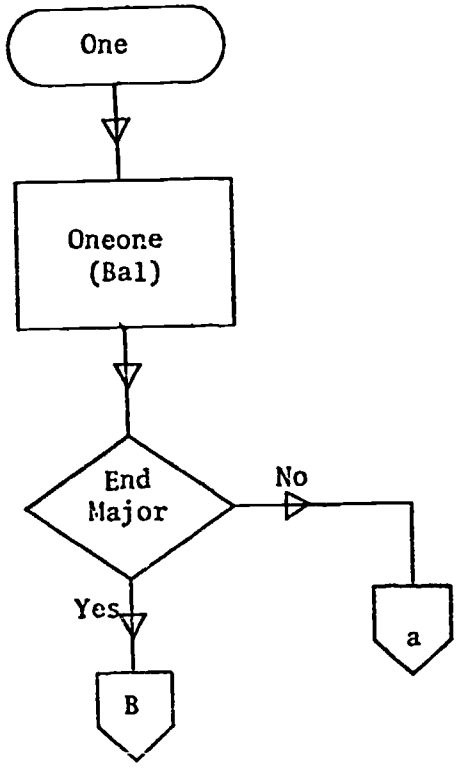


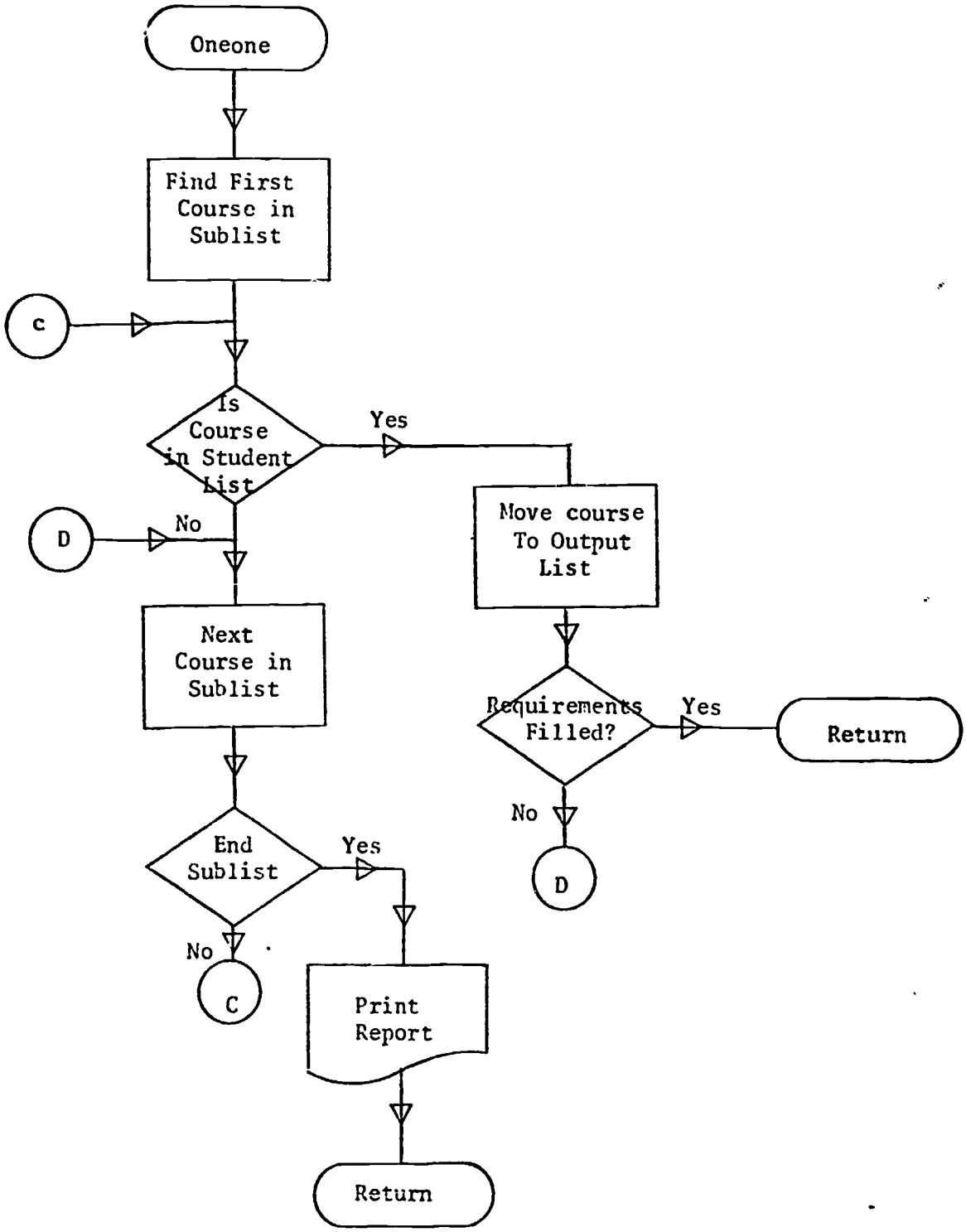

a
Sublist III
Yes
One
No
Sublist 2222
Yes
Two
No
Sublist 8500
Yes
EITFIF
No
Error
e


Getlist
Read a Major or Minor title
E of File
Return
No
Build Title Table


Require
Read A Require-ment card
End of File
Yes
Return
No
Type 9999
Yes
Set up For new
No
Type 1111 2222 3500
Yes
Set Up New Sublist
No
Add Require-ment Courses to Table


Student
Read a Student Record
End of File
Yes
Return
No
'01' card
Yes
Move in Name of Student
No
'02' Card
Yes
Move in Address of Student
No
'03' Card
Yes
Move in Students Majors & Minors
No
'04' Card
Yes
Move in Student Courses
No
Error Message
Return


One
Oneone
(Bal)
End
Major
No
Yes
a
B


Oneone
Find First Course in Sublist
C
Is Course in Student List
Yes
No
D
Move course To Output List
Next Course in Sublist
Requirements Filled?
Yes
Return
No
D
End Sublist
Yes
No
C
Print Report
Return

FILE DESCRIPTION 1

MESSAGE	MESSAGE NO.
OTHER NAMES USED	LAYOUT NO.
	FORM NO
	NO. OF COPIES
MEDIA	HOW PREPARED
OPERATIONS INVOLVED IN	
REMARKS	

CONTENTS

NO	DATA NAME	From	Thru	Total	Remarks
1	Sequence Number	1	4	4	
2	Course Title	5	13	9	
3	Prerequisite 1	14	22	9	
4	Prerequisite 2	23	31	9	
5	Link Course	32	40	9	
6	Hours	41	43	3	
7	Title	44	73	30	

DATE ANALYST SOURCE PAGE

STUDY

MESSAGE	MESSAGE NO.
Registration File Description, A-Record	
OTHER NAMES USED	LAYOUT NO.
	FORM NO.
	NO. OF COPIES
MEDIA	HOW PREPARED
OPERATIONS INVOLVED IN	
REMARKS	

CONTENTS

NO.	DATA NAME	From	Thru	Total	Remarks
1	Dummy	1	1	1	
2	Course Code	2	10	9	
3	Dummy	11	34	24	
4	Sequence Number	35	38	4	
5	Dummy	39	57	19	
6	Prerequisite 1	58	66	9	
7	Prerequisite 2	67	75	9	
8	Dummy	76	99	24	
9	Link Course	100	108	9	
10	Hours of Credit	109	111	3	
11	Dummy	112	128	17	

DATE ANALYST SOURCE PAGE

STUDY

MESSAGE	MESSAGE NO.
Registration File Description, B-Record	
OTHER NAMES USED	LAYOUT NO.
	FORM NO
	NO. OF COPIES
MEDIA	HOW PREPARED
OPERATIONS INVOLVED IN	
REMARKS	

CONTENTS

NO	DATA NAME	From	Thru	Total	Remarks
1	Dummy	1	30	30	
2	Course Description	31	60	30	
3	Dummy	61	128	68	

DATE ANALYST SOURCE PAGE

MESSAGE: Registration File Description, C-Record

MESSAGE NO.:

OTHER NAMES USED:

LAYOUT NO.:

FORM NO:

NO. OF COPIES:

MEDIA:

HOW PREPARED:

OPERATIONS INVOLVED IN:

REMARKS:

CONTENTS

NO.	DATA NAME	From	Thru	Total	Remarks
1	Dummy*	1	128	128	
	* This system does not use any information from this record				

DATE

ANALYST

SOURCE

PAGE

STUDY

WHEN ORDERING NEW OR REVISED CARD FORM COMPOSITION.

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

INFORMATION RECORDS DIVISION
MULTIPLE-CARD LAYOUT FORM 1

Form X24-6599-1
Printed in U.S.A.

Company ____________

Application ____________ by ____________ Date ____________ Job No. ____________ Sheet No. ____________

Major Header

Type '9999'	BLANK	Major or Minor Code	BLANK
1–4	5–9	10–17	18–80

Subgroup Header

Type '1111'	BLANK	No. of Crs.	BLANK	Totl Hrs. Nd.	BLANK	Zeros	BLANK	Zeros	BLANK
1–4	5–9	10–12	13–18	19–21	22–27	28–30	31–36	37–39	40–80

Type '2222'	BLANK	No. of Crs.	BLANK	Totl Hrs. Nd.	BLANK	No. in 1st Grp	BLANK	Hrs. from 1st Grp	BLANK
1–4	5–9	10–12	13–18	19–21	22–27	28–30	31–36	37–39	40–80

Type '8500'	BLANK	No. of Cr.	BLANK	Totl Hrs. Nd.	BLANK	No. of Fields	BLANK	zero	BLANK
1–4	5–9	10–12	13–18	19–21	22–27	28–30	31–36	37–39	40–80

(unused card)
1–80

Course List

Course Sequence Code	BLANK	Crs. Seq. Code	BLANK	Crs. Seq. Code	BLANK	Crs. Seq. Code	BLANK	Crs. Seq. Code	BLANK	Crs. Seq. Code	BLANK	Crs. Seq. Code	BLANK	Crs. Seq. Code	BLANK	BLANK
1–4	5–9	10–13	14–18	19–22	23–27	28–31	32–36	37–40	41–45	46–49	50–54	55–58	59–63	64–67	68–72	73–80

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

GX24-6299-4 U/M025
Printed in U.S.A.

CARD PUNCHING OR VERIFYING INSTRUCTIONS 1

JOB NAME CAAAP Major-Minor Data '9999' Card, Major Header	JOB NO.	CONTROL PANEL NO.	OPERATION NAME	OP. CODE	MACH. TYPE

FREQUENCY	DUE IN		DUE OUT		ESTIMATED VOLUME	EST. TIME
☐ DAILY ☐ MONTHLY ☐ WEEKLY ☐ QUARTERLY ☐ BI-WEEKLY ☐ ANNUAL ☐ SEMI-MONTHLY ☐ OTHER	TIME	DATE	TIME	DATE		HOURS TENTHS

PROGRAM CARD NO. CARD ELECTRO (FORM) NO.

SWITCH SETTINGS - ON	SPECIAL FEATURES USED
☐ PROGRAM UNIT ☐ PRINT ☐☐ (1 2) PROGRAM SELECT ☐ LEFT ZERO PRINT ☐ AUTO FEED ☐☐ (CK PCH) SELF CHECK NO. ☐ AUTO SKIP-AUTO DUPL (VER) ☐☐ (INS ST) CARD INSERT	☐ CARD CORRECTION ☐ AUXILIARY DUPLICATE (VERIFY) ☐ CARD INSERTION ☐ SELF CHECK NO. ☐ AUTO LEFT ZERO ☐ SELF CHECK NO. GENERATOR ☐ ALTERNATE PROGRAM ☐ VARIABLE LENGTH FEED ☐ HI SPEED SKIP ☐ INTERSPERSED GANG PUNCH

SOURCE DOCUMENTS USED:	DISPOSITION OF CARDS:
RECEIVED FROM:	DOCUMENTS

CARD FIELD	FUNCTION*	COLUMNS FROM	COLUMNS THRU	COLUMNS TOTAL	REMARKS
1. Type	P,V	1	4	4	Always '9999'
2. Blank	S	5	9	5	
3. Major or Minor Code	P,V	10	17	8	
4. Blank	S	18	80	63	
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
TOTAL KEY STROKES PER CARD—					

FUNCTION*	SYMBOL
DUPLICATE	D
PUNCH	P
SKIP	S
X-SKIP	XS
VERIFY	V
SELF CK. NO.	CK
LEFT ZERO	LZ

Date: _____

* No. of forms per pad may vary slightly

Section _____ Page _____

IBM

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CARD PUNCHING OR VERIFYING INSTRUCTIONS 2

JOB NAME CAAAP Major-Minor Data Subgroup Header	JOB NO.	CONTROL PANEL NO.	OPERATION NAME	OP. CODE	MACH. TYPE

FREQUENCY	DUE IN		DUE OUT		ESTIMATED VOLUME	EST. TIME
☐ DAILY ☐ MONTHLY ☐ WEEKLY ☐ QUARTERLY ☐ BI-WEEKLY ☐ ANNUAL ☐ SEMI-MONTHLY ☐ OTHER	TIME	DATE	TIME	DATE		HOURS TENTHS

PROGRAM CARD NO. CARD ELECTRO (FORM) NO.

SWITCH SETTINGS - ON	SPECIAL FEATURES USED
☐ PROGRAM UNIT ☐ PRINT ☐☐ (1 2) PROGRAM SELECT ☐ LEFT ZERO PRINT ☐ AUTO FEED ☐☐ (CK PCH) SELF CHECK NO. ☐ AUTO SKIP-AUTO DUPL (VER) ☐☐ (INS ST) CARD INSERT	☐ CARD CORRECTION ☐ AUXILIARY DUPLICATE (VERIFY) ☐ CARD INSERTION ☐ SELF CHECK NO. ☐ AUTO LEFT ZERO ☐ SELF CHECK NO. GENERATOR ☐ ALTERNATE PROGRAM ☐ VARIABLE LENGTH FEED ☐ HI SPEED SKIP ☐ INTERSPERSED GANG PUNCH

SOURCE DOCUMENTS USED:	DISPOSITION OF CARDS:
RECEIVED FROM:	DOCUMENTS

CARD FIELD	FUNCTION*	COLUMNS FROM	COLUMNS THRU	COLUMNS TOTAL	REMARKS
1. Type	P,V	1	4	4	
2. Blank	S	5	9	5	
3. No. of courses	P,V	10	12	3	
4. Blank	S	13	18	6	
5. Total Hours Needed	P,V	19	21	3	
6. Blank	S	22	27	6	
7. Variable Info. 1	P,V	28	30	3	
8. Blank	S	31	36	6	
9. Variable Infor. 2	P,V	37	39	3	
10. Blank		40	80	41	
11.					
12.					
13.					
14.					
15.					
TOTAL KEY STROKES PER CARD—					

FUNCTION*	SYMBOL
DUPLICATE	D
PUNCH	P
SKIP	S
X-SKIP	XS
VERIFY	V
SELF CK. NO.	CK
LEFT ZERO	LZ

Date: _____ * No of forms per pad may vary slightly Section_____ Page _____

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

GX24-6289-4 UM/025 *
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CARD PUNCHING OR VERIFYING INSTRUCTIONS 3

JOB NAME CAAAP Major-Minor Data Course List	JOB NO.	CONTROL PANEL NO.	OPERATION NAME	OP. CODE	MACH. TYPE

FREQUENCY	DUE IN		DUE OUT		ESTIMATED VOLUME	EST. TIME
☐ DAILY ☐ MONTHLY ☐ WEEKLY ☐ QUARTERLY ☐ BI-WEEKLY ☐ ANNUAL ☐ SEMI-MONTHLY ☐ OTHER	TIME	DATE	TIME	DATE		HOURS TENTHS

PROGRAM CARD NO. | CARD ELECTRO (FORM) NO.

SWITCH SETTINGS - ON	SPECIAL FEATURES USED
☐ PROGRAM UNIT ☐ PRINT 1 2 ☐☐ PROGRAM SELECT ☐ LEFT ZERO PRINT ☐ AUTO FEED CK PCH ☐☐ SELF CHECK NO. ☐ AUTO SKIP-AUTO DUPL (VER) INS ST ☐☐ CARD INSERT	☐ CARD CORRECTION ☐ AUXILIARY DUPLICATE (VERIFY) ☐ CARD INSERTION ☐ SELF CHECK NO. ☐ AUTO LEFT ZERO ☐ SELF CHECK NO. GENERATOR ☐ ALTERNATE PROGRAM ☐ VARIABLE LENGTH FEED ☐ HI SPEED SKIP ☐ INTERSPERSED GANG PUNCH

SOURCE DOCUMENTS USED:	DISPOSITION OF CARDS:
RECEIVED FROM:	DOCUMENTS

CARD FIELD	FUNCTION*	COLUMNS FROM	COLUMNS THRU	COLUMNS TOTAL	REMARKS
1. Course Sequence Code	P,V	1	4	4	
2. Blank	S	5	9	5	
3. Course Sequence Code	P,V	10	13	4	
4. Blank	S	14	18	5	
5. Course Sequence Code	P,V	19	22	4	
6. Blank	S	23	27	5	
7. Course Sequence Code	P,V	28	31	4	
8. Blank	S	32	36	5	
9. Course Sequence Code	P,V	37	40	4	
10. Blank	S	41	45	5	
11. Course Sequence Code	,V	46	49	4	
12. Blank	S	50	54	5	
13. Course Sequence Code	P,V	55	58	4	
14. Blank	S	59	63	5	
15. Course Sequence Code	P,V	64	67	4	
TOTAL KEY STROKES PER CARD—					

FUNCTION*	SYMBOL
DUPLICATE	D
PUNCH	P
SKIP	S
X-SKIP	XS
VERIFY	V
SELF CK. NO.	CK
LEFT ZERO	LZ

Section Page

CARD FORM COMPOSITION.

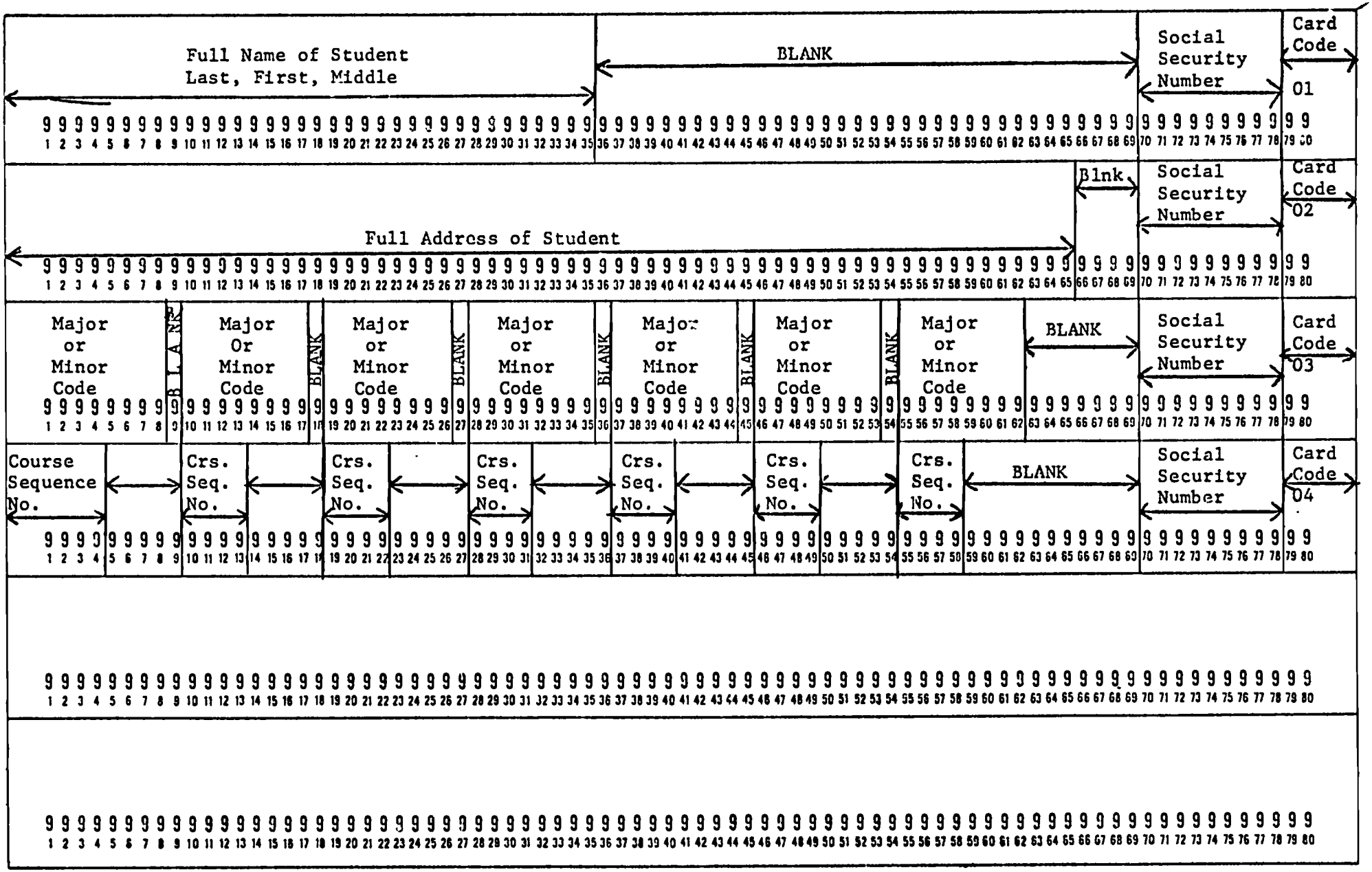
INTERNATIONAL BUSINESS MACHINES CORPORATION

INFORMATION RECORDS DIVISION
MULTIPLE-CARD LAYOUT FORM 2

Form X24-6599-1
IBM H47098
Printed in U.S.A.

Company _____

Application _____ by _____ Date _____ Job No. _____ Sheet No. _____



IBM INTERNATIONAL BUSINESS MACHINES CORPORATION
GX24-6259-4 UM/025
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CARD PUNCHING OR VERIFYING INSTRUCTIONS 4

JOB NAME	JOB NO.	CONTROL PANEL NO.	OPERATION NAME	OP. CODE	MACH. TYPE
CAAAP Student Record '01' Card					

FREQUENCY	DUE IN		DUE OUT		ESTIMATED VOLUME	EST. TIME	
☐ DAILY ☐ MONTHLY ☐ WEEKLY ☐ QUARTERLY ☐ BI-WEEKLY ☐ ANNUAL ☐ SEMI-MONTHLY ☐ OTHER	TIME	DATE	TIME	DATE		HOURS	TENTHS

PROGRAM CARD NO. CARD ELECTRO (FORM) NO.

SWITCH SETTINGS - ON	SPECIAL FEATURES USED
☐ PROGRAM UNIT ☐ PRINT	☐ CARD CORRECTION ☐ AUXILIARY DUPLICATE (VERIFY)
☐☐ (1 2) PROGRAM SELECT ☐ LEFT ZERO PRINT	☐ CARD INSERTION ☐ SELF CHECK NO.
☐ AUTO FEED ☐☐ (CK PCH) SELF CHECK NO.	☐ AUTO LEFT ZERO ☐ SELF CHECK NO. GENERATOR
☐ AUTO SKIP-AUTO DUPL (VER) ☐☐ (INS ST) CARD INSERT	☐ ALTERNATE PROGRAM ☐ VARIABLE LENGTH FEED
	☐ HI SPEED SKIP ☐ INTERSPERSED GANG PUNCH

SOURCE DOCUMENTS USED:	DISPOSITION OF CARDS:
RECEIVED FROM:	DOCUMENTS

CARD FIELD	FUNCTION*	COLUMNS FROM	COLUMNS THRU	COLUMNS TOTAL	REMARKS
1. Student Name	P	1	35	35	In the form: Last, First, Middle
2. Blank	S	36	69	34	
3. Social Security No.	P,V,D	70	78	9	
4. Card Code	P,V	79	80	2	Always '01'
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
TOTAL KEY STROKES PER CARD –		46		80	

FUNCTION*	SYMBOL
DUPLICATE	D
PUNCH	P
SKIP	S
X-SKIP	XS
VERIFY	V
SELF CK. NO.	CK
LEFT ZERO	LZ

Date: _____ * No. of forms per pad may vary slightly Section _____ Page _____

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

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CARD PUNCHING OR VERIFYING INSTRUCTIONS 5

JOB NAME CAAAP Student Record '02' Card	JOB NO.	CONTROL PANEL NO.	OPERATION NAME	OP. CODE	MACH. TYPE

FREQUENCY	DUE IN		DUE OUT		ESTIMATED VOLUME	EST. TIME
☐ DAILY ☐ MONTHLY ☐ WEEKLY ☐ QUARTERLY ☐ BI-WEEKLY ☐ ANNUAL ☐ SEMI-MONTHLY ☐ OTHER	TIME	DATE	TIME	DATE		HOURS TENTHS

PROGRAM CARD NO. CARD ELECTRO (FORM) NO.

SWITCH SETTINGS - ON	SPECIAL FEATURES USED
☐ PROGRAM UNIT ☐ PRINT	☐ CARD CORRECTION ☐ AUXILIARY DUPLICATE (VERIFY)
☐☐ (1 2) PROGRAM SELECT ☐ LEFT ZERO PRINT	☐ CARD INSERTION ☐ SELF CHECK NO.
☐ AUTO FEED ☐☐ (CK PCH) SELF CHECK NO.	☐ AUTO LEFT ZERO ☐ SELF CHECK NO. GENERATOR
☐ AUTO SKIP-AUTO DUPL (VER) ☐☐ (INS ST) CARD INSERT	☐ ALTERNATE PROGRAM ☐ VARIABLE LENGTH FEED
	☐ HI SPEED SKIP ☐ INTERSPERSED GANG PUNCH

SOURCE DOCUMENTS USED:	DISPOSITION OF CARDS:
RECEIVED FROM:	DOCUMENTS

CARD FIELD	FUNCTION*	COLUMNS FROM	COLUMNS THRU	COLUMNS TOTAL	REMARKS
1. Address	P	1	65	65	
2. Blank	S	66	69	4	
3. Social Security No.	P,V,D	70	78	9	
4. Card Code	P,V	79	80	2	Always '02'
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
TOTAL KEY STROKES PER CARD—					

FUNCTION*	SYMBOL
DUPLICATE	D
PUNCH	P
SKIP	S
X-SKIP	XS
VERIFY	V
SELF CK. NO.	CK
LEFT ZERO	LZ

Date: _____ * No. of forms per pad may vary slightly Section _____ Page _____

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

GX24-6299-4 UM/025 *
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CARD PUNCHING OR VERIFYING INSTRUCTIONS 6

JOB NAME CAAAP Student Record '03' Card	JOB NO.	CONTROL PANEL NO.	OPERATION NAME	OP. CODE	MACH. TYPE

FREQUENCY	DUE IN		DUE OUT		ESTIMATED VOLUME	EST. TIME
☐ DAILY ☐ MONTHLY ☐ WEEKLY ☐ QUARTERLY ☐ BI-WEEKLY ☐ ANNUAL ☐ SEMI-MONTHLY ☐ OTHER	TIME	DATE	TIME	DATE		HOURS TENTHS

PROGRAM CARD NO. CARD ELECTRO (FORM) NO.

SWITCH SETTINGS - ON	SPECIAL FEATURES USED
☐ PROGRAM UNIT ☐ PRINT ☐☐ 1 2 PROGRAM SELECT ☐ LEFT ZERO PRINT ☐ AUTO FEED ☐☐ CK PCH SELF CHECK NO. ☐ AUTO SKIP-AUTO DUPL (VER) ☐☐ INS ST CARD INSERT	☐ CARD CORRECTION ☐ AUXILIARY DUPLICATE (VERIFY) ☐ CARD INSERTION ☐ SELF CHECK NO. ☐ AUTO LEFT ZERO ☐ SELF CHECK NO. GENERATOR ☐ ALTERNATE PROGRAM ☐ VARIABLE LENGTH FEED ☐ HI SPEED SKIP ☐ INTERSPERSED GANG PUNCH

SOURCE DOCUMENTS USED:

DISPOSITION OF CARDS:

RECEIVED FROM:

DOCUMENTS

CARD FIELD	FUNCTION*	COLUMNS FROM	COLUMNS THRU	COLUMNS TOTAL	REMARKS
1. Major or Minor Code	P,V	1	8	8	
2. Blank	S	9	9	1	
3. Major or Minor Code	P,V	10	17	8	
4. Blank	S	18	18	1	
5. Major or Minor Code	P,V	19	26	8	
6. Blank	S	27	27	1	
7. Major or Minor Code	P,V	28	35	8	
8. Blank	S	36	36	1	
9. Major or Minor Code	P,V	37	44	8	
10. Blank	S	45	45	1	
11. Major or Minor Code	P,V	46	53	8	
12. Blank	S	54	54	1	
13. Major or Minor Code	P,V	55	62	8	
14. Blank	S	63	69	7	
15. (continued next page)					
TOTAL KEY STROKES PER CARD—					

FUNCTION*	SYMBOL
DUPLICATE	D
PUNCH	P
SKIP	S
X-SKIP	XS
VERIFY	V
SELF CK. NO.	CK
LEFT ZERO	LZ

* No. of forms and may vary slightly

Section_____ Page_____

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

GX24-6299-4 UM/025 *
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CARD PUNCHING OR VERIFYING INSTRUCTIONS 7

JOB NAME CAAAP Student Record '03' Card (continued)	JOB NO.	CONTROL PANEL NO.	OPERATION NAME	OP. CODE	MACH. TYPE

FREQUENCY	DUE IN		DUE OUT		ESTIMATED VOLUME	EST. TIME
☐ DAILY ☐ MONTHLY ☐ WEEKLY ☐ QUARTERLY ☐ BI-WEEKLY ☐ ANNUAL ☐ SEMI-MONTHLY ☐ OTHER	TIME	DATE	TIME	DATE		HOURS TENTHS

PROGRAM CARD NO. | CARD ELECTRO (FORM) NO.

SWITCH SETTINGS - ON	SPECIAL FEATURES USED
☐ PROGRAM UNIT ☐ PRINT ☐☐ PROGRAM SELECT (1 2) ☐ LEFT ZERO PRINT ☐ AUTO FEED ☐☐ SELF CHECK NO. (CK PCH) ☐ AUTO SKIP-AUTO DUPL (VER) ☐☐ CARD INSERT (INS ST)	☐ CARD CORRECTION ☐ AUXILIARY DUPLICATE (VERIFY) ☐ CARD INSERTION ☐ SELF CHECK NO. ☐ AUTO LEFT ZERO ☐ SELF CHECK NO. GENERATOR ☐ ALTERNATE PROGRAM ☐ VARIABLE LENGTH FEED ☐ HI SPEED SKIP ☐ INTERSPERSED GANG PUNCH

SOURCE DOCUMENTS USED:

DISPOSITION OF CARDS:

RECEIVED FROM:

DOCUMENTS

CARD FIELD	FUNCTION*	COLUMNS FROM	COLUMNS THRU	COLUMNS TOTAL	REMARKS
1. Social Security No.	P,V,D	70	78	9	
2. Card Code	P,V	79	80	2	Always '03'
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
TOTAL KEY STROKES PER CARD—					

FUNCTION*	SYMBOL
DUPLICATE	D
PUNCH	P
SKIP	S
X-SKIP	XS
VERIFY	V
SELF CK. NO.	CK
LEFT ZERO	LZ

* No. of forms per pad may vary slightly

Section_____ Page_____

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

GX21-6299-4 UM/025 *
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CARD PUNCHING OR VERIFYING INSTRUCTIONS 8

JOB NAME CAAAP Student Record '04' Card	JOB NO.	CONTROL PANEL NO.	OPERATION NAME	OP. CODE	MACH. TYPE

FREQUENCY	DUE IN		DUE OUT		ESTIMATED VOLUME	EST. TIME
☐ DAILY ☐ MONTHLY ☐ WEEKLY ☐ QUARTERLY ☐ BI-WEEKLY ☐ ANNUAL ☐ SEMI-MONTHLY ☐ OTHER	TIME	DATE	TIME	DATE		HOURS TENTHS

PROGRAM CARD NO. CARD ELECTRO (FORM) NO.

SWITCH SETTINGS - ON	SPECIAL FEATURES USED
☐ PROGRAM UNIT ☐ PRINT	☐ CARD CORRECTION ☐ AUXILIARY DUPLICATE (VERIFY)
☐☐ (1 2) PROGRAM SELECT ☐ LEFT ZERO PRINT	☐ CARD INSERTION ☐ SELF CHECK NO.
☐ AUTO FEED ☐☐ (CK PCH) SELF CHECK NO.	☐ AUTO LEFT ZERO ☐ SELF CHECK NO. GENERATOR
☐ AUTO SKIP-AUTO DUPL (VER) ☐☐ (INS ST) CARD INSERT	☐ ALTERNATE PROGRAM ☐ VARIABLE LENGTH FEED
	☐ HI SPEED SKIP ☐ INTERSPERSED GANG PUNCH

SOURCE DOCUMENTS USED:	DISPOSITION OF CARDS:
RECEIVED FROM:	DOCUMENTS

CARD FIELD	FUNCTION*	COLUMNS FROM	COLUMNS THRU	COLUMNS TOTAL	REMARKS
1. Course Sequence No.	P,V	1	4	4	
2. Blank	S	5	9	5	
3. Course Sequence No.	P,V	10	13	4	
4. Blank	S	14	18	5	
5. Course Sequence No.	P,V	19	22	4	
6. Blank	S	23	27	5	
7. Course Sequence No.	P,V	28	31	4	
8. Blank	S	32	36	5	
9. Course Sequence No.	P,V	37	40	4	
10. Blank	S	41	45	5	
11. Course Sequence No.	P,V	46	49	4	
12. Blank	S	50	54	5	
13. Course Sequence No.	P,V	55	58	4	
14. Blank	S	59	69	11	
15. (continued next page)					
TOTAL KEY STROKES PER CARD–					

FUNCTION*	SYMBOL
DUPLICATE	D
PUNCH	P
SKIP	S
X-SKIP	XS
VERIFY	V
SELF CK. NO.	CK
LEFT ZERO	LZ

Date: _____

* No. of forms per pad may vary slightly

Section _____ Page _____

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GX24-6299-4 UM/025 *
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CARD PUNCHING OR VERIFYING INSTRUCTIONS 9

JOB NAME CAAAP Student Record '04' Card (continued)	JOB NO.	CONTROL PANEL NO.	OPERATION NAME	OP. CODE	MACH. TYPE

FREQUENCY	DUE IN		DUE OUT		ESTIMATED VOLUME	EST. TIME
☐ DAILY ☐ MONTHLY ☐ WEEKLY ☐ QUARTERLY ☐ BI-WEEKLY ☐ ANNUAL ☐ SEMI-MONTHLY ☐ OTHER	TIME	DATE	TIME	DATE		HOURS TENTHS

PROGRAM CARD NO.

CARD ELECTRO (FORM) NO.

SWITCH SETTINGS - ON	SPECIAL FEATURES USED
☐ PROGRAM UNIT ☐ PRINT ☐☐ 1 2 PROGRAM SELECT ☐ LEFT ZERO PRINT ☐ AUTO FEED ☐☐ CK PCH SELF CHECK NO. ☐ AUTO SKIP-AUTO DUPL (VER) ☐☐ INS ST CARD INSERT	☐ CARD CORRECTION ☐ AUXILIARY DUPLICATE (VERIFY) ☐ CARD INSERTION ☐ SELF CHECK NO. ☐ AUTO LEFT ZERO ☐ SELF CHECK NO. GENERATOR ☐ ALTERNATE PROGRAM ☐ VARIABLE LENGTH FEED ☐ HI SPEED SKIP ☐ INTERSPERSED GANG PUNCH

SOURCE DOCUMENTS USED:

DISPOSITION OF CARDS:

RECEIVED FROM:

DOCUMENTS

CARD FIELD	FUNCTION*	COLUMNS FROM	COLUMNS THRU	COLUMNS TOTAL	REMARKS
1. Social Security No.	P,V,D	70	78	9	
2. Card Code	P,V	79	80	2	Always '04'
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
TOTAL KEY STROKES PER CARD—					

FUNCTION*	SYMBOL
DUPLICATE	D
PUNCH	P
SKIP	S
X-SKIP	XS
VERIFY	V
SELF CK. NO.	CK
LEFT ZERO	LZ

NOTE: DO NOT USE THIS FORM WHEN ORDERING NEW OR REVISED CARD FORM COMPOSITION.

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

INFORMATION RECORDS DIVISION
MULTIPLE-CARD LAYOUT FORM 3

Form X24-6599-1
Printed in U.S.A.

Company ______________

Application ______________ by ______________ Date ______________ Job No. ______________ Sheet No ______________

Major or Minor Code	BLANK	Title, Description of Major or Minor	BLANK
1–7	8–11	12–40	41–80

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INTERNATIONAL BUSINESS MACHINES CORPORATION

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CARD PUNCHING OR VERIFYING INSTRUCTIONS 10

JOB NAME	JOB NO.	CONTROL PANEL NO.	OPERATION NAME	OP. CODE	MACH. TYPE
CAAAP Major-Minor Titles					

FREQUENCY	DUE IN		DUE OUT		ESTIMATED VOLUME	EST. TIME
☐ DAILY ☐ MONTHLY ☐ WEEKLY ☐ QUARTERLY ☐ BI-WEEKLY ☐ ANNUAL ☐ SEMI-MONTHLY ☐ OTHER	TIME	DATE	TIME	DATE		HOURS TENTHS

PROGRAM CARD NO. | CARD ELECTRO (FORM) NO.

SWITCH SETTINGS - ON	SPECIAL FEATURES USED
☐ PROGRAM UNIT ☐ PRINT	☐ CARD CORRECTION ☐ AUXILIARY DUPLICATE (VERIFY)
☐☐ (1 2) PROGRAM SELECT ☐ LEFT ZERO PRINT	☐ CARD INSERTION ☐ SELF CHECK NO.
☐ AUTO FEED ☐☐ (CK PCH) SELF CHECK NO.	☐ AUTO LEFT ZERO ☐ SELF CHECK NO. GENERATOR
☐ AUTO SKIP-AUTO DUPL (VER) ☐☐ (INS ST) CARD INSERT	☐ ALTERNATE PROGRAM ☐ VARIABLE LENGTH FEED
	☐ HI SPEED SKIP ☐ INTERSPERSED GANG PUNCH

SOURCE DOCUMENTS USED: | DISPOSITION OF CARDS:

RECEIVED FROM: | DOCUMENTS

CARD FIELD	FUNCTION*	COLUMNS FROM	COLUMNS THRU	COLUMNS TOTAL	REMARKS
1. Major or Minor Code	P,V	1	7	7	
2. Blank	S	8	11	4	
3. Title	P	12	40	29	
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
TOTAL KEY STROKES PER CARD–					

FUNCTION*	SYMBOL
DUPLICATE	D
PUNCH	P
SKIP	S
X-SKIP	XS
VERIFY	V
SELF CK. NO.	CK
LEFT ZERO	LZ

Date: _____ * No of forms per pad may vary slightly Section _____ Page _____

GRADUATION REQUIREMENTS

Interdisciplinary:
200 Racism in American Culture and Society (3)
(This course does not count as one of the three departments mentioned above.)

Music:
220 Introduction to Music (3)
321 History and Literature of Music I (3)
322 History and Literature of Music II (3)
423 History and Literature of Music III (2)
437 Piano Literature (2)
438 Piano Literature (2)
445 History of American Music (3)

Philosophy:
100 Introduction to Philosophy: Logic and Formal Reasoning (3)
110 Introduction to Philosophy: Problems of Knowledge and Existence (3)
130 Introduction to Philosophy: Problems of Morality, Art, and Religion (3)
231 Contemporary Moral Issues (3)
250 Logic of Scientific Reasoning (3)
260 The Contributions of Greek Philosophy (3)
282 Philosophy of Myth and Symbolism (3)
331 Classical Ethical Theories (3)
342 Philosophy of the Arts (3)
363 Ideologies (3)
370 Philosophy of Religion (3)
381 Indian Philosophy (3)
382 Chinese Philosophy (3)

Speech:
203 Introduction to Theatre (3)
400 Introduction to Rhetorical Theory and Criticism (3)
401 Contemporary Public Address (3)
470 History of Theatre to 1650 (3)
471 Theatre History, 1650-Present (3)

Science and Mathematics 11-12 semester hours unless exempted from the Mathematic requirement, in which case 8-9 semester hours.

All students must earn a minimum of:

1. 8 semester hours in a laboratory sequence plus one 3 semester hour course in Mathematics. If exempt from Mathematics requirement, 8 semester hours in a laboratory sequence.
2. 12 semester hours of survey courses distributed among at least three of the following departments, to include one 3 semester hours course in Mathematics. If exempt from Mathematics requirement, 9 semester hours of survey courses distributed among three of the following departments

Biological Sciences
Chemistry
Geography
Geology
Mathematics
Physics
Psychology

Laboratory Sequences

Biological Sciences: 6.1 200 and 211 Principles of Biology and General Botany (8)
6.2 200 and 251 Principles of Biology and General Zoology (8)

Chemistry: 6.3
110, 111 Chemistry and Laboratory
and
230, 231 Introductory Organic Chemist and Laboratory (8)
210, 211 General Chemistry and Qualitative Analysis (8)

Geography: 6.4 200 and 201 Fundamentals of Physical Geography I and II (8)

Geology: 6.5 120 and 120A Introductory Geology and Laboratory
and
6.6 121 and 121A Earth History and Laboratory (8)

Physics: 6.7 250 and 251 General Physics (8)

Survey Courses ← 6.8

Biological Sciences: 103 General Biology (3)
418 Human Heredity (2)

Chemistry: 110 Chemistry (3)

Geography: 101 Survey of Physical Geography (3)

Geology:
103 Planetary and Space Science (3)
or
344 Planetary and Stellar Astronomy (4)
(Students may not take both Geology 103 and Geology 344 to meet the General Education requirements)
104 Introduction to Oceanography (3)
105 Environmental Geology (3)
108 Introduction to Earth Physics (3)
120 Introductory Geology (3)

Mathematics:
120 Introduction to Mathematics (3)
130 Excursions into Mathematics (3)
155 Elementary Mathematical Analysis (5)
201 Foundations of Elementary Mathematics I (3)

	202 Foundations of Elementary Mathematics II (3) 210 Basic Mathematical Analysis I (3) 211 Basic Mathematical Analysis II (3) 229 Calculus and Linear Algebra I (4) 230 Calculus and Linear Algebra II (4)
Physics:	150 Physics (3)
Psychology:	102 Introduction to Psychology (3)

Social Sciences

All students must earn a minimum of 9 semester hours of credit in at least two departments.

Anthropology	Home Economics
Business Education	Industry and Technology
Economics	Political Science
Geography	Sociology

Election must be made from the following courses:

Anthropology:	120 Introduction to Anthropology (3) 220 General Cultural Anthropology (3) 240 General Physical Anthropology (3) 422 History of Anthropology (3) 433 Material Culture of Primitive Peoples (3)
Business Education:	300 Business in Modern Society (3)
Economics:	260 Principles & Problems of Economics I (3) 261 Principles & Problems of Economics II and/or any other 300 or 400 level courses for which the student has the prerequisites.
Geography:	202 World Regional Geography (3) 353 Conservation of Natural Environment (3) 434 Agricultural Geography (3) 437 Industrial and Commercial Geography (3) 451 Political Geography (3) 462 Urban Geography (3)
Home Economics:	180 Personal Development and the Family (3)
Industry and Technology:	291 Introduction to Technology (3)
Political Science:	140 Introduction to American Government and Politics (3) 200 Introduction to Political Science (3) 260 Introduction to Comparative Politics (3) 280 Introduction to International Politics (3) 305 American Parties & Pressure Groups (3)
Sociology:	170 Introduction to Sociology (3) 250 Contemporary Social Institutions (3) 260 Social Psychology (3)
Interdisciplinary:	200 Racism in American Culture and Society (3) (This course does not count as one of the two departments mentioned above.)

Requirements may also be met by transfer credit, course proficiency examination, or advanced placement.

OTHER REQUIREMENTS FOR GRADUATION

In addition to meeting the General Education requirements listed above, all candidates for baccalaureate degrees (Bachelor of Arts, Bachelor of Fine Arts, Bachelor of Science, Bachelor of Science in Education, and Bachelor of Music) must satisfy the following requirements:

They must earn a minimum of 124 semester hours of credit (including 40 semester hours in senior college courses) with a cumulative grade average of "C" in all credit earned and an average of "C" in the major field. Not more than 30 semester hours may be taken in extension classes and/or by correspondence.

They must earn 30 semester hours in residence while classified as juniors and/or seniors, with the following exceptions. Students in the College of Business must earn 30 semester hours in residence while classified as seniors. Students enrolled in programs which require them to be off campus during their senior year must earn 30 hours in residence while classified as sophomores and/or juniors.

They must satisfy the major requirements as given in their respective departments. It is possible for students to take two majors and have both majors entered on their permanent records. They must fulfill all the requirements for majors in both departments.

Minors are required in certain programs; see the requirements for degrees as listed under the individual departments.

Students who make a grade of "D" in English 103 in this university

FOOTNOTES

(1) Marvin M. Miller, "The Computer and Testing." The Bulletin of the National Association of Secondary School Principles, Vol. 54 (February, 1970), pp.41-42.

(2) Les E. Barnes, personal interview, June 22 and 26, 1970; Charles DeBaun, personal interview, June 23, 1970; Jack Hall, personal interview, July 1, 1970; John Parsons, personal interview; Eve Simonson, personal interview, June 23, 1970.

(3)Robert W. Kahler, personal interview, June 19, 1970; William A. Healey, personal interview, June 29, 1970.

(4)Don Norwood, Director of Computer Systems and Information, Sangamon State University. Address delivered to Workshop: Computers and Learning, Northern Illinois University, June 23, 1970.

(5)Patrick Suppes and Max Jerman, "Computer Assisted Instruction," The Bulletin of the National Association of Secondary School Principles, Vol. 54 (February, 1970), pp. 27-40.

(6)J. Macy, "Automated Government,"Saturday Review, Vol. 49, p. 24.

(7)Suppes and Jerman, op. cit. p. 28.

(8)Wesley W. Walton, "Computers in the Classroom: Master or Servant?," The Bulletin of the National Association of Secondary School Principles, Vol. 54, (February, 1970), p. 9-17.

(9)Ibid., p. 15.

(10)Stephen O. Mitchell, "Larger Implications of Computerization," The Journal of General Education, Vol. XIX, (October, 1967),p. 216-223.

(11)John Caffrey, "The Administrator and the Computer in Higher Education," North Central Association Quarterly, Volume XLII (Fall, 1967), p. 208-213.

(12)Ibid., p. 209.

(13)Ibid., p. 213.

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Caffrey, John. "The Administrator and the Computer in Higher Education," North Central Association Quarterly, Volume XLII (Fall, 1967), pp. 208-213.

DeBaun, Charles, Programmer Department of Computer Services, Northern Illinois University, Personal Interview, June 22, 1970.

Hall, Jack, Director of Users Services, Northern Illinois University, Personal Interview, June 30, 1970.

Healey, William A., Director Undergraduate Professional Program in Physical Education, Northern Illinois University. Personal Interview, June 29, 1970.

Joyce, J. (Editor). Computer Services User Guide: Northern Illinois University, DeKalb, Illinois. Fall 1969.

Kahler, Robert W., Chairman Physical Education for Men, Northern Illinois University, Personal Interview, June 30, 1970.

Macy, John. "Automated Government," Saturday Review, Volume 49, pp.24-26.

Miller, Marvin. "The Computer and Testing." The Bulletin of the National Association of Secondary School Principles, Volume 54, (February, 1970) pp.7-40.

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Parsons, John, Programmer, Department of Computer Service, Northern Illinois University. Personal Interview, June 23, 1970.

Simonson, Eve, Consultant Department of Computer Service, Northern Illinois University. Personal Interview, June 23, 1970.