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HISTORY OF THE DEPARTMENT OF MATHEMATICS THROUGH 1979

Prior to 1946, there were no degrees granted at the School. All education of Naval officers was in preparation for transfer to a civilian school for graduate education. All departments were engaged in this one task with some, of course, playing the role of "major" department for students planning to transfer for graduate work in that discipline. Although Mathematics was never a "major" department, in this sense, its history goes back to the appointment of Professor R. E. Root in 1914. Professor Root had a national reputation as a mathematician. By the beginning of World War II, there were four permanent mathematics professors: Root, Rawlins, Bramble and Church.

In 1946, the School received authority to award degrees and its nature changed quickly. The degree granting departments, such as Physics, Electrical Engineering, Mechanical Engineering, Meteorology and Chemistry, became more important as student thesis effort and research increased. Acting now as a service department to the other degree granting departments, Mathematics nevertheless grew in size. By 1946, there were 12 professors in the Department, headed by W. R. Church, who had become Chairman in 1945.

Professor Church, who had spent the war years on active duty in the Navy, was a keen student of new developments in applied mathematics. The applications of statistics to strategy in anti-submarine warfare had led to many other applications in the analysis of Naval operations. As this new area of science continued to grow after the end of the war, Professor Church and the Department of Mathematis were leaders in the development of the new curriculum in operations analysis, which began in 1951-52. Professors Torrance from Mathematics and Cunningham from Physics taught the initial courses in this discipline. They were soon assisted by Professor Rom Oberbeck, added to the mathematics faculty in 1951. After a period of growth and development, during which several statisticians were added to the faculty to handle the gradual shift in emphasis from physical science to statistical analysis as the curriculum adjusted to the needs of the Navy, the School created the Department of Operations Research with Oberbeck as Chairman. He was succeeded, two years later, by Jack Borsting, who was also from the Department of Mathematics.

By 1966, the separation of Operations Research from Mathematics was completed with the shift of five professors who taught most of the statistics for Operations Analysis students from Mathematics to Operations Research. The offspring to which Mathematics had given birth was already up to a strength of 19 professors and still growing.

Professor Church was also keenly interested in the development of the computer world, started in the war years by the Harvard Mark I and by the University of Pennsylvania Moore School Computer. Professor W. E. Bleick, 1946, and B. J. Lockhart, 1948, had been involved with these computer developments before coming to the Department of Mathematics. However, Professor Church was the leader in the movement to obtain the first electronic automatic digital computer which was installed in the Department of Mathematics in 1954 and instruction started in programming and using such devices. This led in 1960 to the acquisition of the first CDC Computer and formation of the School's Computer Center, later to be named in honor of Professor Church.

Computer courses quickly became standard in almost every curriculum in the School and use of the computer in research work increased rapidly at the School. However, it was not until 1967 that the Navy established the Computer Science courses and the addition of more faculty in this area. The existence of this group of specialists within the Department of Mathematics and their interaction with faculty in other departments (chiefly electrical engineering) who worked with computers led to formation of the Computer Science Group in 1973; however, the professors involved maintained their status in the Department of Mathematics until 1976 when the Department of Computer Science was formed. At that time, five faculty members moved from Mathematics to the new department.

Thus, in about 30 years, the Department of Mathematics has seen two sub-disciplines emerge and develop into thriving departments, each with its own cadre of graduate students, student thesis effort and sponsored research.

The cycles of growth and decline in the size of the Department of Mathematics faculty are depicted in the attached chart. Many factors have entered into these changes over the years: rise and fall in the total enrollment; shift in enrollment percentages from engineering and physical science to administration and policy sciences; initiation of undergraduate curricula in 1956 and their termination in 1975; initiation of the Immediate Graduate Education Program in 1967 and its termination in 1975; development of operations analysis and computer science curricula and formation of the two new departments; and the reduction in the basic mathematics given to the typical student in most curricula.

HISTORY OF THE MATHEMATICS DEPARTMENT, 1979-1984

ONR Chair The ONR Research Chair was established in 1979. Professor Gordon Latta occupied the Research Chair for two years, 1979-1981. In May of 1981 he was appointed Professor of Mathematics and, in 1983, he became Chairman of the Mathematics Department. During his tenure in the Chair, he conducted a seminar in applications of singular integral equations. Participants included faculty members from the departments of Mathematics, Mechanical Engineering, Electrical Engineering and Operations Research. He gave two invited talks to regional meetings of mathematical associations. The first was given to the Northern California Section of the Mathematical Association of America on February 23, 1980 at a meeting which was held at the Naval Postgraduate School. The talk was about "Solutions of Boundary Value Problems via Singular Integral Equations". The second was given to a meeting of the Society for Industrial and Applied Mathematics and the American Mathematical Society at The University of Nevada, Reno, on April 25, 1981. The title of the talk was "The Role of Microcomputers in Mathematics". During his term as holder of the ONR Research Chair, Professor Latta initiated a new course on microprocessors, MA 3035.

The second person to occupy the Chair was Professor Garrett Birkhoff, who was on leave from Harvard University. Professor Birkhoff occupied the Chair from January to mid-May of 1983. He prepared a set of over 30 lectures on numerical fluid dynamics. These notes were published by the Naval Postgraduate School. They were the basis for a course taught by Professor Birkhoff, MA 4393. Professor Birkhoff organized a Conference on Elliptic Problems which was held at the Naval Postgraduate January 10-14, 1983. Professor Birkhoff and Professor Arthur Schoenstadt of the Mathematics Department were co-editors of the Proceedings which were published in the book, Elliptic Problem Solvers II, 1984.

In addition, Professor Birkhoff worked with Professors Richard Franke and Donald Gaver of NPS on techniques of optimal interpolation and approximation. He organized an interdepartmental seminar on the use of computers to model fluid motions. Professor Birkhoff also gave an invited talk to the Northern California Section meeting of the Mathematical Association of America at Stanford University, February 26, 1983. The talk was on "Hilbert's 'rundlagen der Geometrie', Revisited".

TI-59 Calculator Program. The TI-59 Calculator program was developed during the years 1978-1984. Professor Maurice Weir gave the first course on the TI-59 Calculator in 1978. The notes for this course led to the publication of his book, Calculator Clout in 1981 and a second book, Calculus by Calculator in 1982. By 1982, enrollment in the course was up to 400 to 500 students per year. Enrollment began to decline when it became apparent

that a computer course would be more effective for the students. By the end of 1984, the Department was planning to phase out the program. Our experience with the TI-59 program has implications for the micro-computer laboratory. There will be the need to continually update the technology.

Continuing Education Courses. The Department of Mathematics has made a substantial contribution to the program in Continuing Education. Since 1976, short courses have been developed for Pre-Calculus and Calculus (Prof. Weir), Vector Analysis (Prof. Lucas), Differential Equations (Prof. Schoenstadt), and Management Mathematics (Prof. Russak). The longest list of courses in the NPS catalog of self-study courses is provided by the Mathematics Department with a total of 28 courses. This work provides an important contribution to the mission of the Naval Postgraduate School by providing off-campus instruction that prepares students for NPS.

ASW Program. One of the important programs developed at the Naval Postgraduate School during this period was the ASW (Anti-Submarine Warfare) Program. The first input for the program was in 1973. Professor Wilde was instrumental in the development of the mathematical part of the program. The program was successful and similar programs were developed for the EW (Electronic Warfare) Program in 1976 and C^3 (Naval Intelligence) Program in 1980. Nonetheless, the program contains only one substantial course in mathematics, MA 3139, Partial Differential Equations and Fourier Series. Besides MA 3139, there is a one-quarter calculus review course, a short course in differential equations, and a short course in vector analysis.

This is an important program. We should make an effort to incorporate improvements into the program, including improvements that may evole from the new TTP program. At times, the department has reacted to the need for, say, a short course in calculus or differential equations by using the "inexpensive" Schaum's Outlines as textbooks. An "inexpensive" book cannot replace a sound textbook. During the last few years, the department has made an effort to phase out the use of Schaum's Outlines in this program and in the entire Mathematics Program. Another ingredient the program needs is effective teachers. In most cases, one would expect the teaching staff to come from within the Mathematics Department. Newly arrived Adjunct/Visiting Professors or Professors from other departments who rarely teach courses in mathematics should not be used to staff this program.

TTP Program. The first courses in the Technical Transition Program were given in the Fall of 1984 for about six students. The first regular input to the program is in the Spring Quarter, 1985. The purpose of the program is to provide Unrestricted Line Officers with the academic background to qualify them to enter many technical graduate programs at NPS. Currently, the students assigned to the TTP Program are, for the most part, a subset of the 460 Engineering Science Program. The program includes work in pre-calculus and calculus with substantial use of microprocessors.

Upon completion of the program, the student will enter a technical program and in mathematics will be prepared to take the second course in calculus, MA 1116. This is the first program at NPS which is administered by the Mathematics Department.

Mathematical Modeling--Books Published. Besides books that have already been mentioned, the following books were published by members of the Department during the period 1979-1984:

1. A First Course in Mathematical Modeling by Maurice Weir and Frank Giordano (1984).

2. Advanced Engineering Mathematics by Ladis D. Kovach (1982).

3. Boundary Value Problems by Ladis D. Kovach (1984).

4. Game Theory, by Guillermo Owen (1982).

The development of the course in Mathematical Modeling is noteworthy. The program began with a seminar for the faculty in 1982 given by Frank Giordano, a visiting professor from West Point. The first course was given for six students in the Spring of 1982. Enrollment has increased, and the course is now given twice yearly for from 50 to 60 students per year. A solution manual for the book listed above is now near completion. This should add to the popularity of the course at NPS and at other universities, as well.

One Measure of Progress Since 1979. The planning report of 1979 for the Mathematics Department contains many recommendations. It seems appropriate to comment on the recommendations contained in Section B of that report and indicate the progress (if any) made on each recommendation.

1. Lack of graduate students in mathematics. During the last five years, the situation has remained about the same. We need a more substantial graduate program to stimulate research. There is some indication that we have lost ground in this area. There may not be enough graduate students to sustain the program at its present level.

2. The lack of a unified research effort is regarded as a weakness by members of the Department. There has been no progress on this recommendation.

REPRODUCED AT GOVERNMENT EXPENSE

3. The lack of means to combat the teaching of mathematics courses in other departments. The situation remains about the same. Course or segments of courses in numerical analysis, Fourier series, Laplace transforms, complex variables and differential equations are taught by other departments.

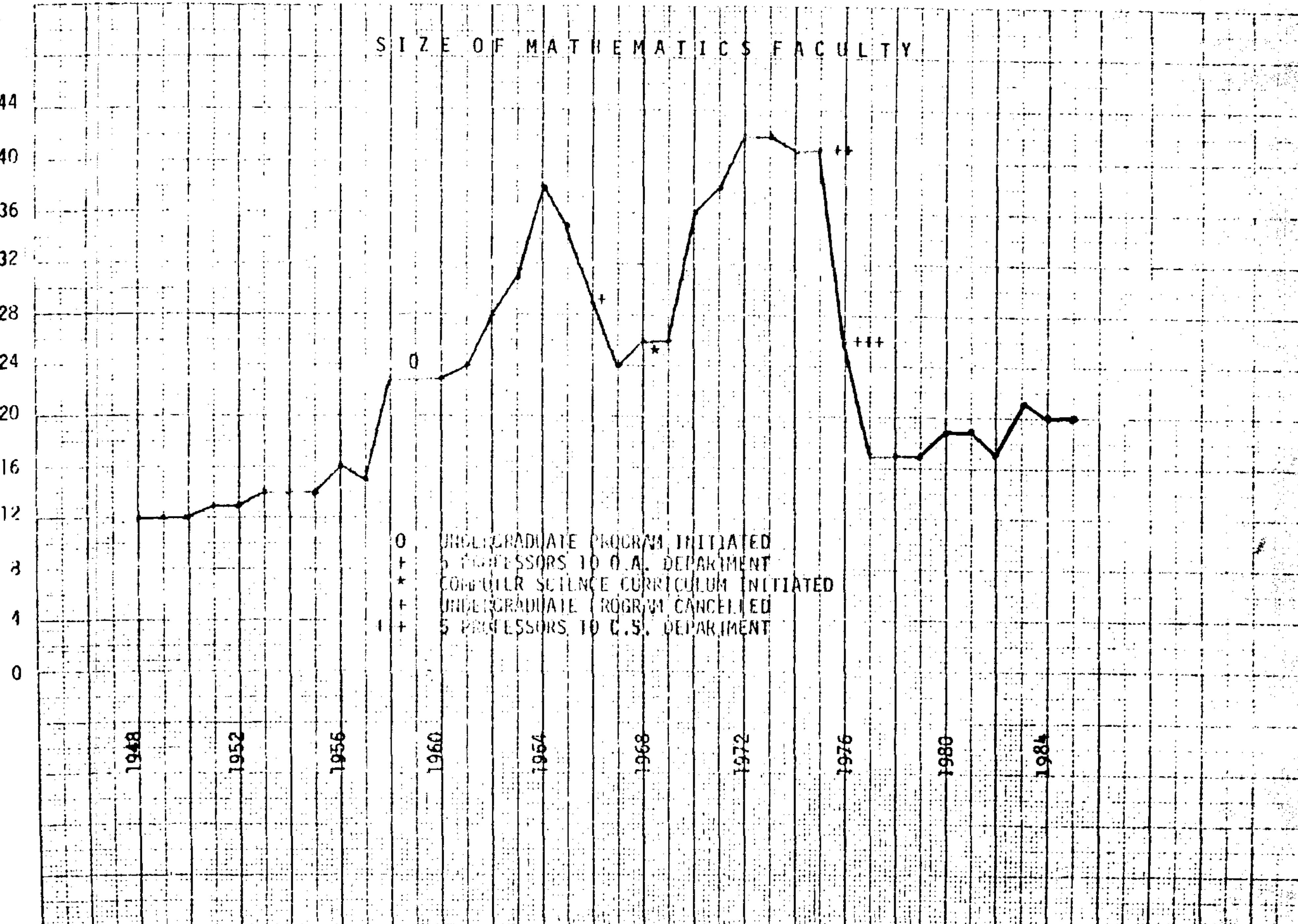
4. Although some of their instruction is excellent, average to indifferent performance by faculty on loan from other departments continues to be a problem. There is progress in this area -- at least in the sense that we have been allowed to recruit faculty for the Mathematics Department. The problem may stem from a shortage of faculty in the Mathematics Department.

5. The Department lacks expertise in applied algebra and discrete mathematical structures. This problem has essentially been solved by the addition of Professor Harold Fredricksen. He is well qualified to teach and conduct research in the areas mentioned.

6. The Department has a need for increased expertise in numerical analysis, numerical methods for differential equations, and computation. The Department, under the chairmanship of Professor C. Wilde and Professor G. Latta, has attempted in various ways to support this area. In terms of faculty hired to fill tenure track positions, one can only list Professor Raul Mendez as a specialist in this area.

7. The Department needs "new blood". Compared to the 1972-1978 period when we did not hire, there has been considerable progress in this area, especially if we count adjunct professors, as well as the addition of four faculty members to tenure track positions. The number of faculty in the Department has remained relatively stable at about twenty members, as indicated in the Table appended to this report.

In the sense that "new blood" indicates a need for a stimulating environment, then one of the most successful efforts during the years 1979-1984 has been the establishment of the ONR Chair in Mathematics. There have been two occupants of the ONR Chair during this period and numerous visiting and adjunct professors. The adjunct/visiting professor program perhaps has not been as effective as one should expect. There have been solid contributions by individuals, but we might look for improvement in this area. This leads to two recommendations-- that we increase our effort to fill the ONR Chair and that we look for ways to make the adjunct/visiting professor program more effective.



NAVAL POSTGRADUATE SCHOOL
NUMBER OF COURSE SECTIONS OF FIVE OR MORE STUDENTS AND FOUR OR LESS STUDENTS
AND AVERAGE NUMBER OF STUDENTS BY DEPARTMENTS FOR
FALL 1983, (Q1, AY84) THRU SUMMER 84 (Q4, AY84)

DEPARTMENTS	TOTAL	AV SAF	SUBTOTALS W/O AV SAF	COMP SCI	MATH	A.S.	O/R	SEC AFF	PH	E.E.	METEO	AERO	OCEAN	MECH ENGR
FALL 83 - Q1, AY84														
Course Section ≥ 5 Students														
Number of Sections	319	11	308	25	30	51	43	30	27	43	10	18	11	20
Students in Sections	6,291	494	5,797	724	658	1,134	757	437	378	901	155	236	118	299
Average per Section	19.72	44.91	18.82	28.96	21.93	22.24	17.60	14.57	14.00	20.95	15.50	13.11	10.73	14.95
Course Section ≤ 4 Students														
Number of Sections	86	0	86	11	5	9	12	23	7	5	2	6	3	3
Students in Sections	144	0	144	15	10	13	19	34	12	9	5	11	6	10
Average per Section	1.67	-	1.67	1.36	2.00	1.44	1.58	1.48	1.71	1.80	2.50	1.83	2.00	3.33
WINTER 84 - Q2, AY84														
Course Section ≥ 5 Students														
Number of Sections	321	12	309	24	26	44	46	31	21	47	10	21	13	25
Students in Sections	5,974	530	5,444	667	448	950	841	377	277	942	147	289	154	352
Average per Section	18.61	44.17	17.62	27.79	17.23	21.59	18.28	12.16	13.19	20.04	14.70	13.76	11.85	14.08
Course Section ≤ 4 Students														
Number of Sections	85	0	85	4	5	14	3	27	5	3	8	11	1	4
Students in Sections	149	0	149	4	11	26	4	50	9	7	14	15	2	7
Average per Section	1.75	-	1.75	1.00	2.20	1.86	1.33	1.85	1.80	2.33	1.75	1.36	2.00	1.75
SPRING 84 - Q3, AY84														
Course Section ≥ 5 Students														
Number of Sections	287	6	281	20	21	43	37	31	25	43	14	18	11	18
Students in Sections	5,525	288	5,237	512	418	930	728	411	371	1,030	187	264	123	263
Average per Section	19.25	48.00	18.64	25.60	19.90	21.63	19.68	13.26	14.84	23.95	13.36	14.67	11.18	14.61
Course Section ≤ 4 Students														
Number of Sections	83	0	83	21	5	10	9	14	8	3	4	5	3	1
Students in Sections	126	0	126	31	12	16	12	19	18	3	4	7	3	1
Average per Section	1.52	-	1.52	1.48	2.40	1.60	1.33	1.36	2.25	1.00	1.00	1.40	1.00	1.00
SUMMER 84 - Q4, AY84														
Course Section ≥ 5 Students														
Number of Sections	292	12	280	23	18	50	40	28	20	38	10	16	14	23
Students in Sections	5,933	616	5,317	656	449	1,030	689	404	313	879	119	281	173	324
Average per Section	20.32	51.33	18.99	28.52	24.94	20.60	17.23	14.43	15.65	23.13	11.90	17.56	12.36	14.09
Course Section ≤ 4 Students														
Number of Sections	93	0	93	17	5	9	4	22	5	6	4	7	8	6
Students in Sections	159	0	159	23	9	11	11	44	10	9	7	12	17	6
Average per Section	1.71	-	1.71	1.35	1.80	1.22	2.75	2.00	2.00	1.50	1.75	1.71	2.13	1.00

CURRENT STATUS OF THE MATHEMATICS DEPARTMENT

A. OVERVIEW

The current status of the Mathematics Department is best considered in three separate areas - teaching activity, research activity, and a profile of the current faculty. An overview of these three areas is presented in this section. The following sections review this status in more detail.

Current teaching activities result from factors almost totally outside the department's (and in many cases the school's) control. As the only academic department without a Navy-sponsored master's degree program, Mathematics experiences a workload consisting almost exclusively of service courses supporting other departments' programs. The number (and sometimes the content) of these courses is specified by the other departments, often as the result of curriculum reviews to which Mathematics department representatives are not as a rule invited. In addition, the lack of thesis students causes the average faculty member to teach significantly more (and at lower academic levels) than the norm for the remainder of the campus. The net result is that the primary focus of department resources (and probably of department interest) is the teaching of undergraduate mathematics. Without question, the department excells in this teaching, as evidenced by its three Schieffelin Award winners (more than any other department), however this focus is not necessarily in the department's best long term interest. Several new teaching initiatives are currently being undertaken in the department, but their long-term effect is unclear at this time.

While several individual faculty are active in research, the department lacks a strong, focused research program. Probably less than half the permanent faculty is involved in supported scholarly research. This is partly due to the lack of departmental thesis students and the absence of opportunities to teach

at the graduate level in one's scholarly specialty (both a result of having essentially no departmental master's program), and partly due to the particular personalities involved. In any event, the low level of departmental research involvement has had several negative consequences.

The department's permanent faculty are fairly senior, at least in age if not correspondingly in academic rank, and recent departmental hiring has been at the more senior levels. There is some reason for concern about the prospects for future promotion and salary advancement of department members, and some disagreement about the most appropriate level for current recruiting. The number of current permanent billets would support only abouth fifty percent of the teaching load except for the low level of departmental research. The extensive use of adjuncts, rehired annuitants, intersessional callbacks and faculty from other departments to meet teaching load shortfalls poses significant potential drawbacks for both the department and the individuals involved.

B. DEPARTMENTAL TEACHING ACTIVITY

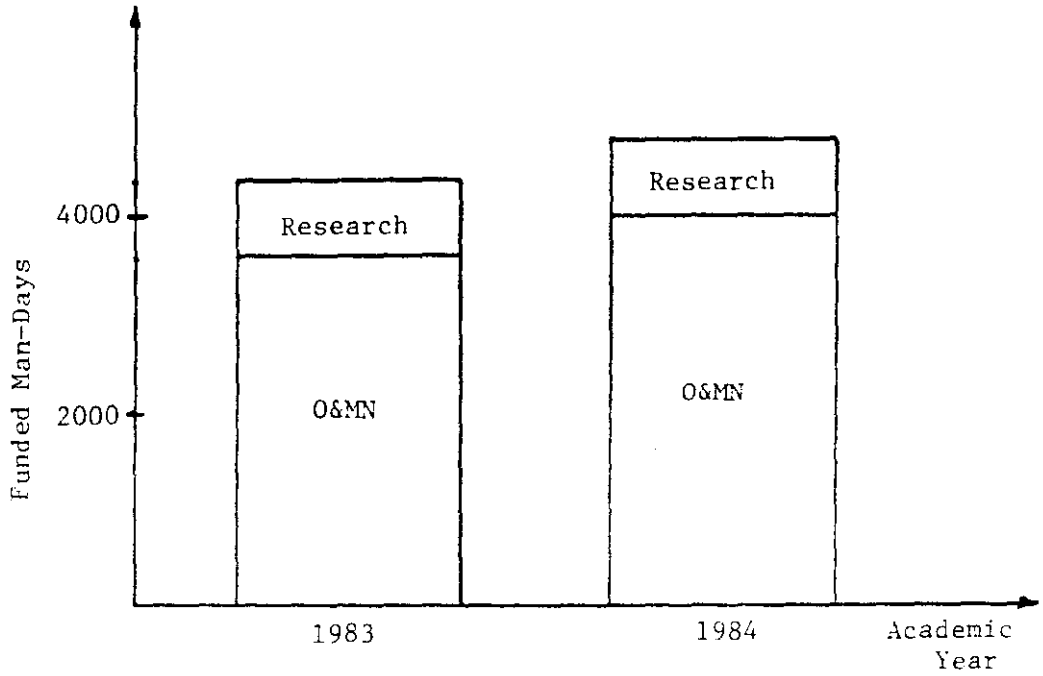
1. Functions. In supporting the Postgraduate School's basic mission, a major portion of the Mathematics Department's efforts involve teaching. This teaching function, however, further subdivides into three distinct areas. These areas, not necessarily in order of percentage of departmental effort, are teaching of:

(a) Specialized mathematics courses for doctoral candidates with minors in mathematics and for selected advanced masters' degree candidates (primarily from other curricula). By and large, these courses are all at the 4000 level. While the number of them is small, they are extremely important in providing an opportunity for faculty to teach at a level that stimulates and reinforces scholarly research.

(b) Advanced service courses which are part of the standard program in several curricula. These courses are at the 3000 level, and are limited to the areas of partial differential equations/Fourier methods, numerical analysis, and discrete mathematics. While some material from these courses may be relevant to student thesis research, the opportunity to use or reinforce current research efforts is minimal.

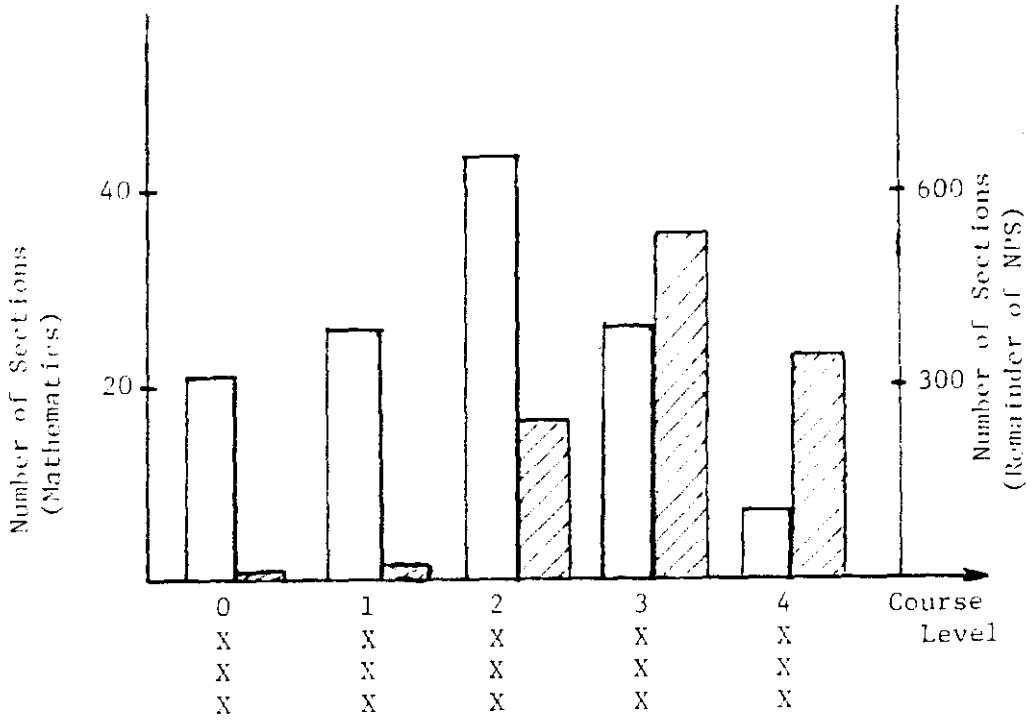
(c) Basic and/or remedial courses, taught either on campus or under the Continuing Education program, to students from virtually all curricula. These courses are undergraduate in nature, at the 2000 level and below, and provide little or no scholarly stimulation.

2. Course Profile and Teaching Effort. The breakdown of total department effort during academic years 1983 and 1984 is shown at Figure 1. As indicated by this figure, approximately 83% of the total departmental effort was supported by O&MN funding, and hence can be considered directed toward the various teaching functions described above. Figure 2 displays, for academic year 1984, a histogram by course level of classes taught. (For this purpose, any class of three or more students was assumed to have



BREAKDOWN OF TOTAL FUNDED MAN-DAYS
MATHEMATICS DEPARTMENT

Figure 1



FREQUENCY OF MATHEMATICS COURSES BY LEVEL
ACADEMIC YEAR 1984

Figure 2

been taught, although classes of less than five students do not normally receive "credit" in the faculty budget.) As this figure indicates, approximately 73% of the departmental teaching effort was directed at the basic/remedial level. (By contrast, the shaded portion of Figure 2 indicates that only approximately 25% of the teaching efforts of the other academic departments at NPS are at this level.) Combining the information from these first two figures, shows that approximately 61% of the departments total effort is directed at teaching basic/ remedial mathematics.

The department's course level structure impacts the average level at which the department faculty teach compared to the faculty in the other NPS departments. Table I compares, based on data for academic year 1984, the average course level taught by Mathematics Department faculty with average course level taught by the remainder of NPS faculty. (Not shown is the fact that, of

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Table I

Course Level	Number of Faculty With Average Course Taught at This Level	
	Mathematics	Other Academic Departments
0.00-0.49	3	0
0.50-0.99	2	1
1.00-1.49	4	3
1.50-1.99	6	2
2.00-2.49	6	37
2.50-2.99	3	32
3.00-3.49	1	114
3.50-4.00	0	105*

* Includes 44 who taught only 4000 level courses.

fourteen permanent faculty members in Mathematics, only four taught at least one course at the 4000 level during academic year 1984. In contrast, one hundred ninety out of two hundred ninety-four faculty in the other academic departments taught at least one 4000 level course during this time.) Clearly, Mathematics faculty have very limited opportunities to teach at levels that stimulate and reinforce scholarly research.

In terms of total teaching workload, during academic year 1984, the department scheduled a total of 136 mathematics courses (including multiple sections). These courses represented a potential effort of 576 contact hours (including problem sessions). While some were sufficiently small that they were given as reading courses, others were large enough to warrant splitting into multiple sections under current school policies. Using the guidelines that any class with five or more students is eligible for "credit" in the faculty budget, and that the maximum class size should be thirty students, these courses represent a "creditable" teaching effort of 571 contact hours. (This latter figure is equivalent to almost fifty-two faculty man-quarters, and, if the department faculty were involved in research at the levels found in other NPS departments, would justify a department of twenty-seven faculty.)

If courses taught by faculty borrowed from other academic departments were eliminated a "creditable" departmental teaching effort of 554 contact hours would remain. Considering the department's academic year 1984 O&MN faculty budget of 17.15 man years, this equates to an average workload of 32.3 "creditable" contact hours per O&MN funded man year. By contrast, the remaining academic departments at NPS taught a total 5181 "creditable" contact hours with a total faculty budget of 218.6 equivalent O&MN man years. (In determining equivalent O&MN man years, academic associate man years were not included, and each military faculty man year was considered equivalent to 4/3 of an O&MN faculty man year.) Based on this, the average classroom teaching workload in the remaining academic departments was 23.7 contact hours per O&MN man year, or only about 75% of the Mathematics department

workload. The difference is explainable in terms of thesis student credit granted to other departments - credit which the Mathematics department is essentially precluded from obtaining due to our unique status.

3. Advanced Courses. As noted above, Mathematics is the only academic department without a Navy-sponsored master's degree program. In addition, current indications are that the NPS administration will not initiate any efforts to reintroduce such a program. While four students from other services are currently pursuing an MS in Mathematics, and one Navy student is in a dual MS degree program including mathematics, these numbers are not sufficient to justify, under current school policies, the offering of any significant number of advanced mathematics courses specifically to support these students. However, approximately ten to fifteen current Ph. D. candidates are minoring in mathematics, and these students have provided sufficient numbers to justify offering at least four 4000 level courses (MA 4611, MA 4622-23, and MA 4672) on a relatively frequent basis, partly because the presence of a department member on each student's doctoral committee provides a direct mechanism to influence the mathematics content of their programs.

Beyond the courses necessary to support the above mentioned students, the number of advanced mathematics courses the department can realistically offer is determined by factors totally external to the department. The number, and general content of mathematics courses that support any given curriculum are determined by the curricular review process, and, as noted above, department representatives are seldom invited to these reviews. With the recent pressures to reduce the average program length, this process has resulted in students in virtually every curriculum taking fewer advanced mathematics courses in 1985 than students in the same curriculum took in 1970. (Although the number of basic/remedial mathematics courses has not always decreased by the same proportion.) Somewhat disturbing to the

department is that, in several instances, the same advanced mathematics that was deleted from curricula by deleting mathematics courses has reappeared in courses within the major department. In some cases, even the same textbook that was used in the mathematics course is carried over into the major department course.

Teaching at the graduate (4000) level in one's scholarly specialty would seem to be a necessary element in continuing scholarly vitality. Nevertheless, as noted above, because of the lack of a really viable mathematics master's program, and because of the downgrading in mathematics courses taken by students in other curricula, only four members out of a permanent faculty of fourteen taught (classes of three or more students) at this level during all academic year 1984.

4. New Teaching Initiatives. Within the past two years, the department has initiated two new courses, in microprocessors and mathematical modeling, that are attracting sufficient students to be considered currently viable. The introduction of these courses demonstrates a department vitality and willingness to expand, although, on the negative side, each course has been taught by only a single faculty member, and interest among other faculty in the department in teaching those courses seems limited. Furthermore, both courses are at the 3000 level, require no 3000 level prerequisites, and have not yet generated 4000 level follow-on courses. In this sense, they do not contribute significantly to solving the average course level problems discussed above. Lastly, department growth in the area of microprocessors is currently questionable, due to the small percentage of faculty with access to microcomputers in their offices.

A second initiative currently underway is the Technical Transition Program (TTP). This effort, in its current form, consists entirely of 1000 level mathematics, and therefore contributes to the low average course level problem. In addition, TTP courses, like earlier PSI efforts, potentially divert

faculty attention into efforts that do not necessarily contribute significantly to future promotion and career advancement at NPS.

C. RESEARCH ACTIVITY

1. Measures of Involvement. A complete picture of the department's research involvement cannot depend on a single indicator. There are probably a minimum of four components that must be considered. Total research funded mandays is one component. However, the amount of effort devoted to thesis advising, the amount of outside sponsorship (as opposed to NPS Foundation sponsorship) and the output of scholarly papers are also important components.

Thesis advising can be an important element of faculty research. Many faculty at NPS essentially refuse to accept thesis students who will not work in the faculty member's area of sponsored research. Thus, these students provide a double benefit in that they not only serve as a vehicle to keep the faculty member current in his scholarly area, but also often their theses, with minor revision, form the basis for technical reports or journal articles coauthored by the faculty member.

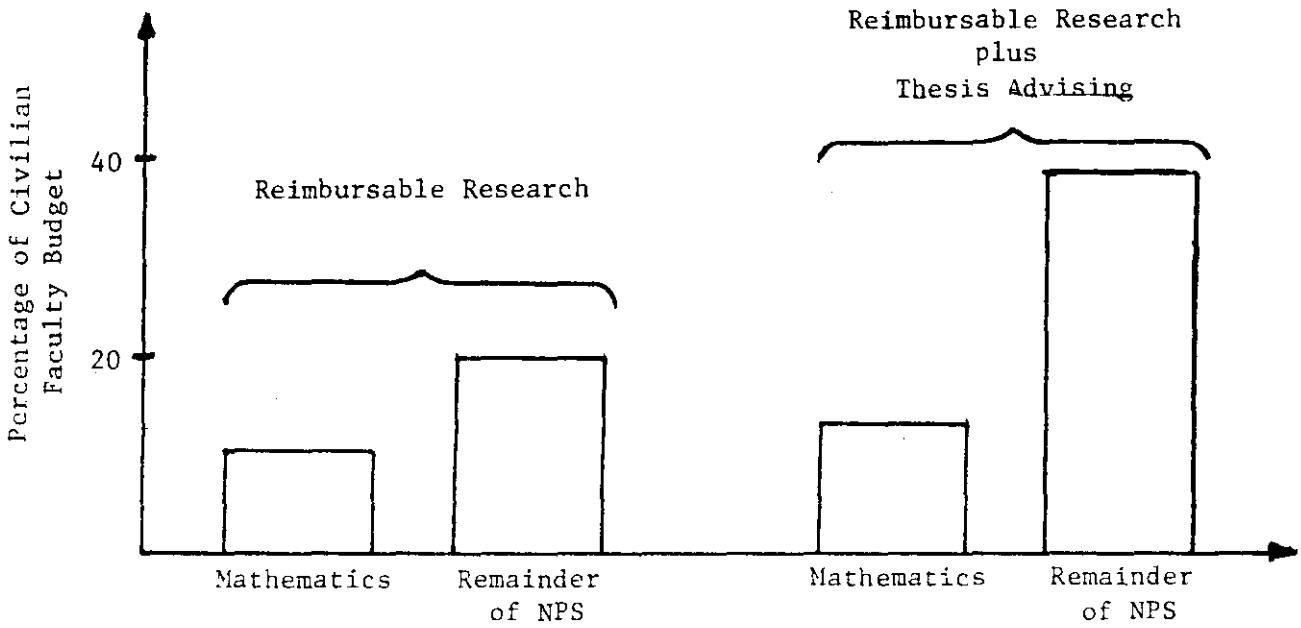
Support by sponsors other than the Foundation is important because the Foundation emphasizes projects which may be in very early stages and hence of unknown actual value. Therefore, outside sponsorship indicates a more proven quality, both of the project and the investigator, and the ability of a faculty member to attract continual outside funding reflects, to some degree, that faculty member's stature in the outside professional community. More importantly, the Foundation discourages reliance on long-term Foundation support. In some instances, faculty who have been performing publishable quality research have nevertheless been turned down after continual years of solely Foundation support and then either ceased or severly curtailed their involvement in research. Therefore, faculty whose sole support is from the Foundation present questionable long-term research prospects.

The output of scholarly publications is an important indicator because a faculty member may be active in scholarly research without funding support, although considering the current depart-

ment teaching loads and absence of thesis students, this possibility is more remote than might be the case at a civilian institution. Also, equally important, scholarly publication is a key measure by which other schools rate the quality of our department.

2. Levels of Supported Effort. As noted above, only approximately 17% of total departmental funded man-days were supported by research funds. Figure 3 compares a related measure, the percentage of the academic year 1985 departmental faculty budget designated for research-related activities with the same percentage for the other academic departments at NPS. (The percentage shown for reimbursable research is lower than the 17% mentioned above, since the latter includes intersessional funding, while the faculty budget addresses only the academic year.) As this figure indicates, the department's reimbursable research effort is only slightly more than half the average for the remainder of the school. When thesis-related efforts (over which the department has essentially no control) are added, there is a major gap between the percentage of time spent by members of the department on research-related tasks and the equivalent percentages for the rest of the school. As noted above, thesis credit reduces the average classroom teaching load in the other academic departments from the Mathematics department's average of 32.3 hours per man year to 23.7 hours, or, essentially, from three courses per quarter to only two. (Inasmuch as thesis students commonly contribute significantly to faculty research projects, a strong argument could be made that thesis credit provides, in fact, a major O&MN funded subsidization of research in the other academic departments, and that the Mathematics department, because it lacks a degree program, pays the double penalty of losing not only "free" labor, but also this "subsidy.")

In terms of involvement in sponsored research, of the fourteen permanent faculty, only three appear to have established a consistent record of participation in research sponsored by agencies outside NPS. One other appears to be developing such



PERCENTAGES OF CIVILIAN FACULTY BUDGET
DESIGNATED FOR RESEARCH RELATED ACTIVITIES

Figure 3

support. At this time, only these four have research funding for academic year 1985. Three more have intermittent recent support, including that from the NPS Foundation. (A concern is that these three faculty have, if anything, recently decreased in overall supported research activity.) Seven of the permanent faculty have no recent supported research activity.

Only two of the department's faculty are joint investigators on a project. The others who are active are either working alone, or in collaboration with faculty from other departments or schools. Without question, department members interact more with researchers outside the department than with each other. In total, all of the measures that might apply to the department's research offer little to suggest an overall department research program or focus. This creates an especially difficult situation for new young faculty joining the department, since they must then develop their own personal research program in almost total isolation, and without senior faculty support.

3. Scholarly Publication. The department pattern in publication is similar to that in supported research. Only four faculty have published significantly in refereed research journals since 1981. Three others have published occasionally in either research journals or in books directed toward research scholars. In addition, three other faculty are quite active in publishing in the undergraduate mathematics education journals, or in writing undergraduate textbooks. However, this latter activity, while bringing some name recognition to the department and school, is not viewed as equivalent to or a substitute for scholarly research, and again contributes to the image of a department not significantly involved in research.

4. Other Factors. Two other factors have some bearing on the Department's research efforts. The first of these, which is a direct consequence of the lack of an advanced degree program, is that there are essentially no Mathematics graduates in the fleet or in systems commands who, as interesting or challenging re-

search problems arise, contact the department or their previous thesis advisor to pass along that information. Such situations routinely happen with other academic departments and groups. The net result is that the department is effectively cut off not only from many potential sources of funding, but also from valuable input on what areas of mathematics are most relevant to Navy problems.

A second factor with negative impact is the low level of funding for mathematics research nationwide, as cited in the just-released David (National Research Council Ad Hoc Committee on Resources for the Mathematical Sciences) Report. This has been especially true in DOD, where the Mansfield ammendment severly constrained basic research funding, and in the Navy, which has abolished separate mathematics divisions or groups at several Navy Laboratories. Although both the military research offices and NSF have announced increases in support to mathematics, most of that increase is targeted for high dollar grants to support relatively few "centers of excellence." Without even a viable masters' program, the chances for the NPS Mathematics Department to participate significantly in this increased funding seems minimal.

5. Effects of Current Research Level. The current low level of department research, and especially of outside sponsorship, has several negative effects on the department. Most immediate, if not most important, is the loss of funding levels above the department OPTARs. Although department OPTARs have increased in recent years, the lack of significant ten percent and sponsor funds has curtailed department growth. For example, although microcomputers are becoming prevalent in almost all current undergraduate and graduate mathematics education, only two of the permanent faculty have school-furnished microcomputers of any type in their offices. (In addition, one permanent and one adjunct's personally owned microcomputers are in their offices.) By contrast, other departments (using research derived funds) seem to be able to place microcomputers in virtually every faculty

member's office. The effects of this will become even more pronounced as NPS moves to more and student use of microcomputers.

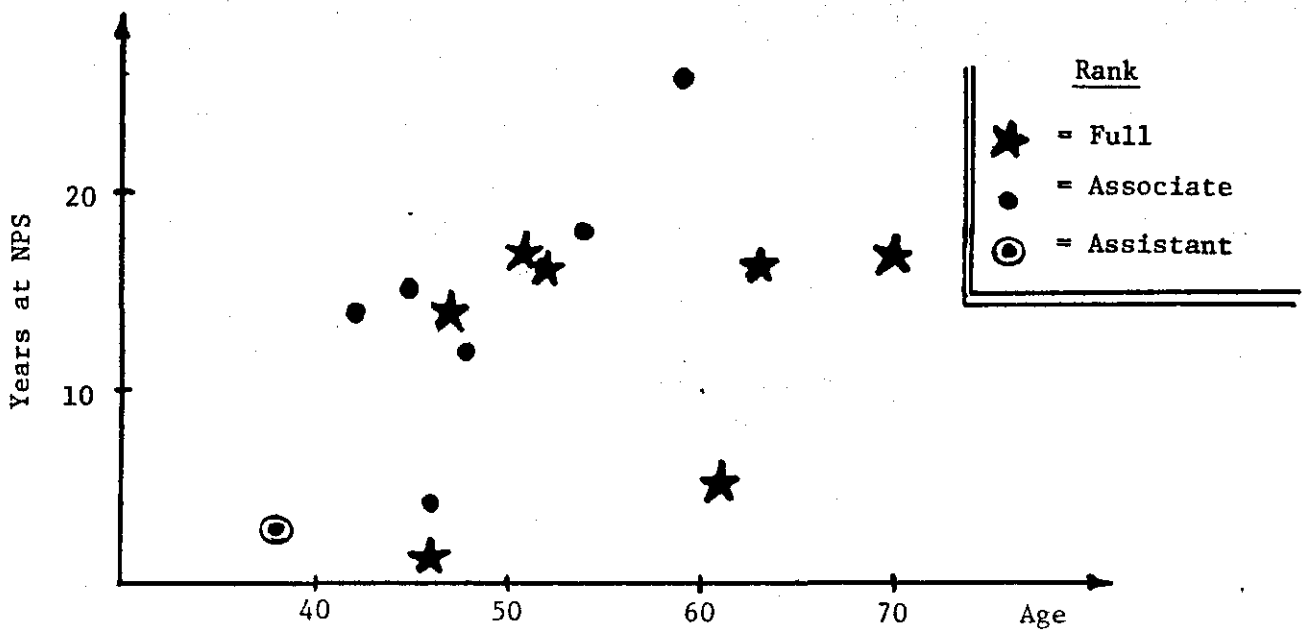
The current low level of departmental scholarly research affects the light in which the department is viewed by others on campus. Research is considered to be an important part of the faculty involvement at NPS and a department which is not viewed as the professional equivalent of its peers in this area can expect to have significant difficulties, including in obtaining promotion and tenure for its faculty, and in the degree to which its input on course and curriculum content is sought and/or heeded. Perhaps not coincidently, these latter areas have been continual problems for the department.

D. DEPARTMENT FACULTY PROFILE

1. Age and Rank. The department currently consists of fourteen permanent (tenure track) faculty, four adjuncts and three intermittently rehired annuitants, plus faculty occasionally borrowed from other NPS departments. (In addition, offers are being made to fill three vacant tenure track billets.) All but three of the permanent faculty are tenured, and two of these will be considered for tenure this year. Three of the adjuncts can be considered as long term, however there is no certainty that they will be offered tenure track billets should more be available.

The current permanent faculty is noticably senior, in age if not in rank. Only one is below the rank of associate professor, and all of the associate professors are at the age where many, if not most, of their contemporaries have already been promoted to full professor. A graphical breakdown of the age and rank structure of the permanent faculty is shown in Figure 4. Especially critical to shaping the long term evolution of the department is that fifty percent of the permanent faculty is in the age range of 45-55 and has about 15-20 years service at NPS. Under current rules, these faculty have the option of retiring in, on the average, as little as about 7 years, or of refusing to retire for on the average of almost twenty years.

Although to protect individual privacy, detailed data to substantiate the following cannot be shown in this report, an analysis of the current pay step structure of the department shows that the current permanent faculty, for whatever reasons, lag significantly behind their contemporaries in the other academic departments at NPS. Specifically, using the NPS permanent faculty salary diagram shown at Figure 5, each permanent department faculty member's current step was compared to the median step of all faculty within two years on either side (in terms of years since baccalaureate). The results showed that only four of the fourteen permanent faculty were above the median of their



Distribution of Age and Rank

Figure 4

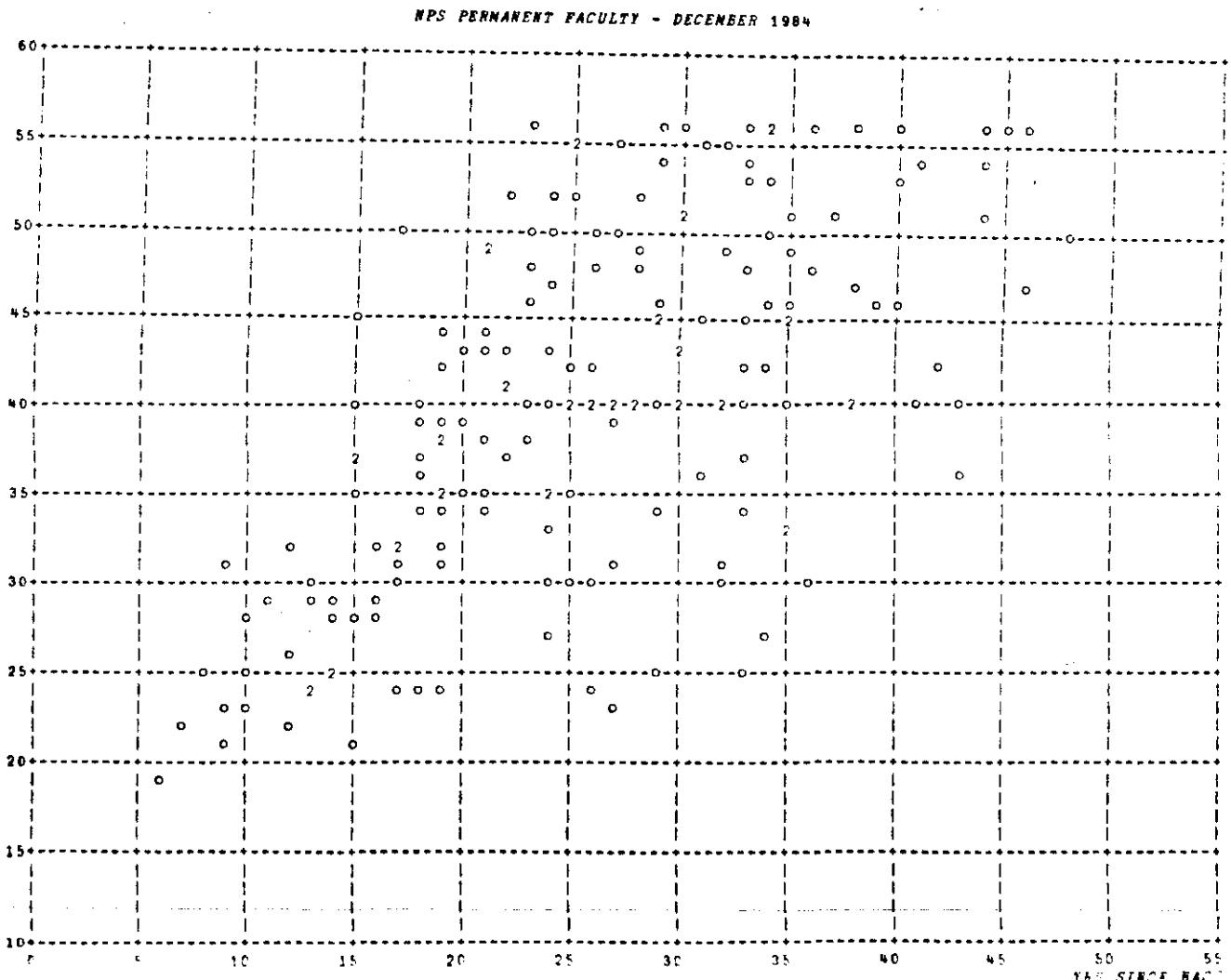


Figure 5

contemporaries, and over the entire department there was a net deficiency of thirty-six steps.

A final key element, since six of the seven current associate professors received their baccaluareates at least twenty years ago, is recent department history in the promotion process. The experience here has not been particulary positive, for since 1975, only one department member has been promoted on their first consideration. In 1984, two department members with times in grade as associate professors of 11 and 14 years were both not promoted, although NPS advertises an average time in grade of 10.5 years for promotion of an associate professor to full professor. The effects on departmental morale of these last two areas discussed should not be ignored.

2. Departmental Areas of Expertise. The department does have several areas of scholarly expertise, although, in line with the comments above about the lack of a departmental research focus, the number of faculty with expertise in any one area is generally small. (For this purposes of this discussion, expertise in a given area is determined primarily based on a record of some scholarly publication in that area.) The appropriate areas, and the faculty who are considered to have current expertise in that area, are shown in Table II.

3. Temporary Faculty. In recent years the department has lacked sufficient permanent billets to meet teaching and research workloads. (Most departments at NPS face the same situation.) To fill the shortfall, the department has utilized temporary faculty from several different sources, primarily:

(1) Visiting Adjuncts (a single one year term)
(2) Long-Term Adjuncts (repeated one year terms)
(3) Rehired Annuitants
(4) Faculty borrowed from other NPS departments

While necessary as an interim measure, this approach has several drawbacks, both for the department and, in the case of long-term adjuncts, for the individuals involved. On the other

E. SUMMARY

The Mathematics Department today faces several challenges, almost all of which in fact derive from a single source - the lack of a viable advanced degree program in Mathematics. These challenges include heavier than average contact hour teaching loads, a basic undergraduate teaching focus, a relative paucity of professionally stimulating courses, the lack of "free" research assistants (in the form of thesis students), an unfocused or nonexistent departmental research program, and limited funding for departmental needs due to limited research funding.

These challenges must be surmounted, since continuation of the status quo poses severe potential problems for the long-term professional vitality of the department and for the career development of the individual department faculty. At first, these might be viewed as local problems for the department to address, and without question, the department must take a major role here. There are, however, two strong reasons why this should not be viewed as totally a local problem. First, the fundamental problem, lack of an advanced degree program, is neither of the department's making nor within the department's power to correct. (In fact, the basic situation is really addressable only outside NPS.) Secondly, in the long term, a strong, viable Mathematics Department which is the professional equal of the other academic departments at NPS is in the best interests of NPS. This is not only because no organization, including NPS, can be stronger than its weakest link (or department), but also because mathematics couses form the "critical path" of virtually every student's curriculum, and weaknesses in this critical path department cannot help but eventually translate into curricular problems effecting the entire school.

D R A F T : 2 APRIL 85

FUTURE PLANNING FOR THE MATHEMATICS DEPARTMENT

INTRODUCTION

The role of the Mathematics Department is that of a service department, teaching courses in support of other curricula, and thus the fortunes of the Department are largely beyond the control of the Department itself. Most of the major problems faced by the Department arise from one single fact: There is no Navy/DOD sponsored advanced degree program in Mathematics. Despite the fact that this has far reaching consequences, it is beyond the power of the Department to change without significant help from the administration. Some of the effects of the lack of a program which adversely affect the Department of Mathematics are the following:

(1) Excessive teaching load relative to the rest of the school
(2) Lack of professionally stimulating courses to teach on a regular basis
(3) Lack of thesis student assistance for research
(4) Lack of areas on which to focus departmental research
(5) Lack of an "advocate" at either the curricular officer or external flag level
(6) Limited incentive for research involvement, and consequently, limited funding for research within the Department.

Certain of the symptoms can be treated, with limited success to be expected, from within the Department of Mathematics. The following sections will discuss and make recommendations for actions to be taken and policies to be followed by the Department. Satisfactory solution of many problems will require the whole-hearted intervention of the administration.

TEACHING

Teaching courses in support of other curricula is the principal reason for the existence of the Department of Mathematics, and without the strong intervention of the administration, this is very unlikely to change in the near future. In order to remain competent in teaching, it is necessary for a number of steps to be taken to maintain and enhance the effectiveness of the faculty. Since our students require training in the applications of Mathematics it is necessary that most, if not all, of the faculty be familiar with current applications in their field. For some of the faculty this can be done through research supported by (generally) U. S. Government laboratories and other facilities. For others, either because of lack of interest in doing research, or because their research is rather specialized and likely to be relevant to the work of only a few students, this familiarity with current applications can only be achieved by having sufficient time to peruse the current literature. With our heavy teaching loads, both in terms of hours taught and (particularly) large numbers of students in many classes, along with other duties, this renewal process often gets lost in the shuffle. One possible solution is a reduction in the full load hours to something closer to the school average. Another is the specific granting of released time to study and develop applications. However, neither idea addresses the second problem of (generally) larger number of students in Mathematics classes compared to other departments (where the courses often do not cut across curriculum lines).

While a few new courses have appeared on the Mathematics Department list in recent years, they have generally been at the request (or insistence) of various curricula. We do feel it is important (maybe even required) for the Department to respond to such requests. However, we may need to hold out for some degree of "reasonableness" in terms of what topics, the level, and depth of coverage in a new or revised course. While innovative courses may attract some new students, the potential for gaining enough students for regular presentation of the course by more that one or two faculty members seems rather low. Efforts in this direction with cooperation from other curricula are more likely to be successful, but with the present class load carried by students it is difficult to get even a suggested elective into most curricula.

The content of our courses is usually dictated by the particular curriculum being served. However, the syllabus, textbook, and related items are under the nominal control of the course coordinator. Nonetheless, the Mathematics Department is responsible for all of these aspects, and the entire Department should have some input into the decision process for each course. This is particularly important for our courses under 3000 level, which are taught at one time or another by nearly all faculty members. Related to this is the problem of current condition of course guidance in terms of syllabus and course objectives for each course. Some of these have not been updated recently. Consideration should also be given to the question of whether or not certain courses are still relevant. For example, MA 3243 (Numerical Solution of Partial Differential Equations) has not been formally given for several years. If it is not to be

reinstituted as a regularly given course, it could be given under MA 3730 (Theory of Numerical Computation) or MA 4237 (Topics in Numerical Analysis), as required. MA 3730 has likewise not been given for many years, but this course may be useful at some point, and is better left in the catalog. A different situation is represented by MA 1110 (Introduction to the TI-59 Programmable Calculator). While the course still attracts a sizable number of students, the TI-59 is obsolescent and the course might be better given only as refresher. This could open up the possibility of another Mathematics elective to be taken later on.

Over the period of the last few years, course journals have become neglected. These journals can provide a valuable resource for new faculty, as well as record the history of the course if questions should arise later on regarding the course. One reason that course journals have been neglected is that there is no orientation for new faculty members. NPS is different from most civilian institutions in some ways, especially the maturity of our students and their expectations. The new faculty member generally gets his introduction to these in his first course offering, sometimes with less than satisfactory results.

Another problem, one which is not necessarily unique to the Mathematics Department, is that of faculty serving on a fair number of Doctoral committees, as well as being the second reader on some Master's theses. Usually there is a reason for a member of the Mathematics Department to be on a Doctoral committee, and frequently this entails considerable time to familiarize oneself with the particular problem being addressed so that some guidance can be given to the student. In addition, the Department is receiving quite a number of Mathematics minor students for Doctoral degrees, which requires additional faculty (uncompensated) effort.

While an increase in the number of advanced students is healthy, it is still the case that there are many mathematics courses taught that are essentially reading courses with 1 to 3 students. Also persisting is the problem of having special requests to give reading courses because of time constraints for Doctoral and Engineer's degree students. Occasional consultation with other faculty on various mathematical problems does sometimes occur, usually with the understanding that the Department is a "service department".

RECOMMENDATIONS:

1. Make known to the administration in the strongest possible way the fact that lack of a formal curriculum in Mathematics is a great handicap, one that cannot be overcome by steps which do not take this into account.

2. Seek administration approval for full teaching credit for several 3000-4000 level courses for a trial period of two or more years. These should include the current courses regularly required of Ph.D. minors, as well as a reconstituted version of MA 3243 (Numerical Solution of Partial Differential Equations), and some new courses such as Numerical Linear Algebra, and Advanced Ordinary Differential

Equations. In addition, encourage development of "interesting" courses for electives as well as for Ph.D. minors, generally in cooperation with one of more curricula. These need not be "new" courses, but could be taught under the 4000 level Topics numbers. If such courses can be made viable, at least from time to time (under the current requirement of at least five students), they would alleviate somewhat the current system of offering one-on-one courses that seem to be necessary for most students to complete their program.

3. The outcome of previous recommendation is very dependent on the number of students taking higher level mathematics courses. This can be enhanced by several means. Mathematics majors should be directed into as many of these courses as possible, as early as possible. Priority for teaching the courses should be given to our top faculty members. An agressive campaign should be undertaken to increase the number of Ph.D. and Engineer's degree candidates taking advanced mathematics courses. This effort should include attempts to identify possible candidates and their areas as early as possible, and direct contact with them to inform them of mathematics electives relevant to their specialty.

5. Seek administration support for a lower total course loading in terms of hours in the classroom and the number of students per class to that somewhat more in line with the overall school level. This recommendation is particularly important for those faculty engaged in research and those actively upgrading course content. For the faculty actively pursuing research programs, this reduction could be in lieu of graduate students to do some details of research. These changes should be an aid in our recruiting effort.

5. Institute a formal process for evaluating courses below the 3000 level for content, suitability of syllabus and text, and any other pertinent items. It is recommended that the evaluation be held once yearly and involve all Mathematics faculty who have taught the course within the past year, and any other interested faculty members. The meeting would be called and moderated by the course coordinator. In addition, it is suggested that any course below 3000 level should have a syllabus available to the students and a textbook or (rarely) typed notes (again, available to the students).

6. It should be understood that preparation of the course journal, containing the items specified on the cover page, and its submission to the course coordinator is considered part of the duties of teaching. Course journal files have not been maintained recently, and it is recommended that some effort be put into getting them in order.

7. An orientation for new faculty members should be devised, to be undergone before the beginning of their first quarter here. Pertinent items to be covered include the general makeup and expectations of our students, general policies on exams (e.g., no exams in the 11th week, no early finals), course journals, textbooks, syllabi, and others as determined by the Department.

8. A formal method of compensation for the time spent on Doctoral committees when the duty requires considerable effort in "advising"

the student should be sought. In addition, the idea that the Mathematics Department be considered sort of an available service, perhaps like the library or computer center, with some allowance made for duties that are often rendered but not accounted for, should be investigated. This could take the form of research support for a few days from the inquiring faculty member's contract. There need not be any new mechanism here, just a realization on all sides that it is possible and equitable.

RESEARCH

The research effort of the Mathematics Department as a whole is rather small, although it embraces a surprising number of different areas. It is of high quality and can be the basis for an expansion, but this will require movement on a number of related items.

The lack of graduate students in Mathematics is a serious problem. Aside from the stimulation that students supply, their research often yields the basic background for joint publications or further publishable work by the faculty member. Thus, in addition to being a source of released time from teaching, the thesis student serves to further the faculty member's research effort in direct ways. To a small extent this could be alleviated by having greater access to Postdoctoral personnel and encouraging colleagues to spend their sabbatical and other leaves at NPS, studying with permanent faculty members.

The Research Chair in Mathematics was to serve some of the purposes outlined above, but it has not completely lived up to its promise. It now appears that the formal Research Chair is no longer available, although may be possible to have a person come in a somewhat similar position on an ad hoc basis.

Mathematics suffers from being considered basic research, where funds are more limited than they are for research which has easily identifiable, if not immediate, application. The research program in the Mathematics Department is impacted by this in several ways. First, the amount of research that is done is smaller than it might be because of the desire by some department members to do research in basic areas for which funding is not obtainable. Second, while other faculty do have support, it may not support the project that the investigator wishes. While this may cause some misgivings on the individual's part, the research itself may be very worthwhile, technically good enough to be publishable, and be supportive of the Navy's or other government agency's mission. However, this support is often in the role of the application of known mathematics to other disciplines, and while such projects should not be disparaged, they do not constitute basic mathematical research. This problem is not unique to our department, since it is faced by almost all mathematics departments.

It should be mentioned that the above situation is in marked contrast to that in engineering and other applied departments. In some cases research support is readily available for the asking, with the extensive time required for proposal writing not being necessary.

It would seem that one potential source of funds for basic Mathematics research at NPS is the Foundation Research Program. Attractive as this may seem, continued support for research which fails to obtain funding elsewhere is not the purpose of the program (even if it can be documented that such research is extremely valuable, although this can be done for a short term). Thus, it is unlikely that this option will become feasible as a part of the program. It is possible that some support of basic mathematics research could be obtained from the basic

research oriented Navy laboratories, such as the Naval Research Laboratory. However, it is unlikely that such laboratories have a surplus of funds they are willing to readily share with us.

RECOMMENDATIONS:

1. At the present time the Mathematics Department has no access to the NRC Postdoctoral Program since none of the faculty has been approved for the program. Appeals to the Administration to change this must be made, as it is not within the control of individual departments.

2. Recruiting of colleagues to spend time off at NPS to conduct joint research with permanent faculty could be encouraged by several means. A lighter teaching load, more in line with other departments, would help. This load would still be higher than the load at other research-oriented Universities. A mechanism for allowing some released time for such visiting personnel could perhaps be devised. It is conceivable that 10% funds could be used for this purpose, although there are already other calls on these funds and they are not unlimited.

3. Some alternative sources of research funding need to be developed. This is a difficult problem, and detailed suggestions of how to proceed are not forthcoming here, although contact with Navy labs may be useful. Research administration could be helpful in locating sources or funds.

4. Suitable candidates for a position similar to the research chair should be sought on a continuing basis. The emphasis should be on a cooperative effort with one or more members of the department, rather than on filling the position with a "big name" mathematician. (That is not to say the two must be mutually exclusive, however.) After initial interest is shown, the potential sponsor (probably ONR, although others could be possible) should be contacted to determine if the matter should be pursued any further.

RECRUITING

The recruiting effort in the Mathematics Department is currently undergoing test. Whether or not significant improvements toward the recruitment of tenure track personnel is needed will be known in a few months, after the outcome of our present effort to attract three candidates. The teaching load at NPS does not look attractive compared to that of most universities, and this may be detrimental to our efforts. In addition, the lack of graduate students has a negative impact with respect to recruiting candidates interested in an active research program.

The present makeup of the department in terms of age and level has been addressed elsewhere. It is worth repeating here that the limited amount of recruiting done in the past 12 years or so has been, with one exception, at the intermediate and upper levels. Thus the department is concentrated at an upper age level and badly needs to balance this with young recruits to assure continuity as retirement age approaches for many, and to assure the influx of new ideas.

The problem of recruiting for the adjunct positions is a present and pressing one. The necessarily imprecise forecasts of student load dictate that there be available some pool of talent to fill in when the course load is larger than anticipated. This pool has generally taken the form of callbacks, rehired annuitants, and borrowed faculty. The limited use of each of these is probably necessary. The extensive use of callbacks is not healthy from several points of view. First, the purpose of the intersessional is to give the faculty member some time out of the classroom, which is certainly necessary. Not only are faculty being denied the creative use of their intersessional for self-improvement, research (hopefully, sponsored, since that benefits the school and the department, as well as the individual), or just a chance for a change, but this also decreases the use to which these positions could be put, to bring in new blood, those who might interact with our permanent faculty in research as well as teaching. The use of callbacks is probably preferable to borrowing faculty, as our experience has often (not always) been that other departments are generally not anxious to loan their better faculty.

It is unfortunate that the use of adjuncts, and short term adjuncts in particular, have sometimes led to some problems in the classroom (on the other hand, other adjuncts have performed admirably well). The previous and potential problems here are given rise to by the fact that the Mathematics Department has no policy on adjuncts: no policy on hiring, no orientation with regard to the needs and expectations of our students, and no policy with regard to renewing the position for another year. Present offers seem to be made to anyone available, sometimes because someone in the department knows them, sometimes because they applied. While these may be good reasons for considering someone for an adjunct position, other factors must be considered. It is true that adjunct positions will not (and should not) turn into tenure track positions. Put another way, the adjunct positions should not become a 'proving ground" for tenure track hopefuls. The use of adjunct positions as "long term" inevitably must lead to incorrect

hopes and expectations on the part of the incumbent. Thus there should be no "automatic" renewal of adjunct positions, nor any expectation on the part of the incumbent that it will be renewed, or that a tenure track offer will be made. That is not to say that these things can never happen. Either may happen; it just should never be the expectation.

The efforts of the Mathematics Department in recruiting are generally toward faculty with active reseearch interests. This generally results in the faculty member being available for two quarters of teaching per year. Present faculty members approaching retirement age have taught three quarters per year. If the department is allowed to replace retirees on a one-for-one basis the present problem of being short on teaching faculty will be made worse. It is important to make this fact known to the administration and to request replacement for such retirees on a three-for-two basis.

RECOMMENDATIONS:

1. Recruiting for tenure track positions should generally be made at the lower Associate or (preferably) Assistant level, to persons who will enhance our teaching and research efforts. Strong consideration should be given to forming "areas of excellence" in research by recruiting persons in areas where we already have expertise or where there is a special need, as perceived by the department.

2. An adjunct policy needs to be formulated. Our policy should be to try to bring persons who will perform the primary job of teaching successfully and who will also help our research effort. This means that colleagues of permanent faculty who can meet the primary requirement of successful classroom performance and also interact in a research effort (funded, or not), should get prime consideration.

3. Use of "local talent", and the use of callbacks should be limited to the smallest amount feasible.

4. Request that the administration recognize that replacement of teaching faculty by teaching/research faculty be on the basis of three-for-two.

CHAIRMAN

The present chairman has expressed a desire to step down at the end of his ~~present~~ current term, which is 1 July 1986. While this is 15 months in the future, it is not too soon to began to assess the opinions of the department faculty to determine what course is to be followed. In particular; (a) Will it be possible to hire outside of the school and does the department want to do this? (b) Is there a suitable internal candidate? (c) Is there a suitable candidate from another department? Depending on the answer to (a), especially, action should be taken soon.

RECOMMENDATION

1. A department committee should be formed within the next few months to determine the general attitude of the department, and depending on the results of this study, the next phase of the process should be initiated at the appropriate time.

MICROCOMPUTER LABORATORY

The department Microcomputer Laboratory serves a useful purpose for both the faculty and students at the Naval Postgraduate School. The present level of avalability of machines and software seem to be adequate for the moment, however since it has been mainly department funds which have furnished the laboratory, it is probably time to take stock of the situation. The first question to be resolved should be the purposes of the laboratory. What group is it primarily intended to serve? If it is students, is this an appropriate project for expenditure of department funds? If it is faculty, are they being adequately considered?

RECOMMENDATION

A committee should be formed to investigate the proper role of the Microcomputer Laboratory. After concurrence on what the laboratory should be, plans should be made to make sure adequate funds from the appropriate source are available to update and expand as necessary.

10% FUNDS

The expenditure of 10% funds within the department are presently without discernable guidelines or consultation. No disputes of note have arisen within the department, so apparently there have been no particular disagreements over them. However, these funds represent a potentially divisive issue.

RECOMMENDATION

In order to head off any unnecessary difficulties, the department as a whole should discuss the use of 10% funds and guidelines (perhaps a committee to oversee their use) be should be given.

MISCELLANEOUS

While there are numerous microcomputers nearby, very few of the Mathematics Department faculty have access to a microcomputer in their office, which is required to make full use of their capability. (This is not to say the converse holds; examples abound of equipment being readily available without any use being made of it.) The microcomputer industry is reaching some maturity, and it is time to consider acquisition of microcomputer/workstations for those faculty members which desire and have need for them. In some instances these could be acquired using research funds, although not all research sponsors are willing to provide the necessary funds. In other instances the use of 10% funds may be appropriate. It is probably of some value to try to standardize the type of equipment obtained, although individual needs and preferences may be more important. Use

of standardized technical word processing software for faculty who find it convenient to do wheir own reports might be worthwhile to consider.

Communications within the Mathematics Department have deteriorated over a period of many years. Presently the Department seems to be more a group of individuals doing their own jobs rather than a team doing one big job. Lack of communication has led to a situation where faculty members usually have no idea what difficulties, what projects are being pursued, or what interesting things have happened to other members of the department. This is not necessarily due to lack of formal weekly meetings, and a suggestion that such meetings be instituted is not given here. Rather, it is suggested that informal meetings be held in the faculty lounge on a semi-regular basis, much as was done some 12 or more years ago for a period of time. Various items could be discussed in an informal way. It could be a time where individuals could give a brief overview of the kinds of things in which they are currently interested. Various happenings around the school might be discussed; it's possible we might want to invite someone to talk informally about various projects that concern us (e.g., the new Ocean Sciences Building).