

**ANNUAL REPORT OF THE COMMITTEE ON GRADUATE STUDIES
TO THE FACULTY OF ARTS AND SCIENCES**

October 16, 1989

The narrative section of this report treats the following topics: *I. New Programs; II. Evolving Structure of Graduate Work in Arts and Sciences; III. Contributions of Graduate Students to the Undergraduate Program; IV. Financing of Graduate Stipends; V. Program Evaluations; and VI. Indications of Quality: Commonwealth Fellows.*

I. New Programs

A. In December 1988, the State Council of Higher Education in Virginia approved the university's proposal for a Ph.D. program in Applied Science, to be initiated in the 1990-92 biennium. Developed in close cooperation with NASA-Langley and CEBAF, the program will focus on four areas within applied science: polymeric materials, nondestructive evaluation, accelerator science, and surface science. The Departments of Physics and Chemistry have been primarily involved in preparing for the initial stages of the program. However, as an interdisciplinary program which also involves cooperative teaching and research from the departments of Computer Science and Mathematics, the Applied Science program provides the means for expanded opportunities in graduate education in other subject areas as well. Under consideration is a highly specialized doctoral track in those areas of applied mathematics where this faculty has unusual strength.

Currently a committee chaired by Robert Orwoll, Chemistry, is searching for the Director of the program, who will hold the CSX Chair in Applied Science. Other members are Hermann Grunder (Director, CEBAF), Stephen Park (Computer Science), Richard Petersen (Director, NASA-Langley), Robert Scholnick (Dean of Graduate Studies), David Thompson (Chemistry), and Robert Welsh (Physics).

B. Also last fall, SCHEV encouraged the university to submit a full proposal (Form 1) for a Master's program in Public Policy Analysis. While the degree would be awarded by the Faculty of Arts and Sciences, the program is based on close cooperation with the Schools of Business Administration, Education, Law, and Marine Science. Within Arts and Sciences, the Departments of Economics and Government have been centrally involved in the planning for the program. A committee chaired by David Finifter (Economics) has prepared a proposal for submission to the Faculty. Other members are Robert Archibald (Economics), Lawrence Evans (Government), Carl Hershner (Marine Science), Charles Koch (Law), Roy Pearson (Business), and John Thelin (Education). The proposal was endorsed by the Departments of Government and Economics, and the Committee on Graduate Studies approved it at its meeting on October 18. It will be presented to the Faculty in the spring semester.

II. Evolving Structure of Graduate Work in Arts and Sciences

Since 1986 when the university formally initiated the doctoral program in Computer Science, the faculty has added two additional doctoral programs, American Studies (1988) and Applied Science (1990), and is considering an ambitious program in an area of critical importance, Public Policy. Strong administrative support has enabled this faculty to develop and expand its graduate programs so that graduate work is integral to its mission. The three newest programs are interdisciplinary and each holds great promise. If properly developed, each new program should become a vehicle for continuing curricular renewal and program development. Hence these programs are especially important for an institution like William and Mary which is not a comprehensive university. They offer the following advantages:

A. Curricular Renewal and Flexibility. At a time when fields of inquiry change rapidly, institutions must build into their structure the means of encompassing new modes of inquiry. Since interdisciplinary programs have as one of their mandates the creation of knowledge by exploring the boundaries or intersections of conventional fields or disciplines, the new interdisciplinary programs hold great promise for the College. American Studies, for instance, brings together modes of inquiry from several fields within the social sciences and the humanities. The new Applied Science Program, with its focus on the interdisciplinary field of materials science, formally brings together physics, chemistry, mathematics and computer science. The Public Policy Program will bring together faculty working on similar problems from the Departments of Government, Economics, and Sociology while also incorporating modes of analysis from Law, Business, Education, and Marine Science. The new interdisciplinary programs, along with the Charles Center, offer this faculty new opportunities for scholarly collaboration with colleagues in other departments and schools. They provide institutional vehicles for responding to, and creating, the intellectual change which increasingly characterizes fields of inquiry.

B. Expanded Opportunities in Graduate Teaching. The new interdisciplinary programs greatly expand the opportunities for graduate teaching for the Faculty of Arts and Sciences. Through American Studies, for instance, "Americanists" in departments that do not have graduate programs, such as Philosophy, Fine Arts, Music, and Religion, may now participate in a doctoral program. Similarly, American Studies offers doctoral opportunities for "Master's only" departments, such as English, and the Applied Science Program is a natural means for faculty in Chemistry, which offers the Master's, to engage in doctoral education. The Department's strong research groups in polymetric materials will be largely responsible for one of the program's major "tracks." The Public Policy Program will involve the Economics Department faculty directly in graduate work and expand the opportunities in graduate education for Sociology and Government faculty. The new interdisciplinary programs also present new teaching and research opportunities for faculty in the three established doctoral programs, Physics, History, and Computer Science.

C. Nurturing New Programs. The curricular and research flexibility of interdisciplinary programs provides this Faculty with an opportunity to establish and nurture new programs. Particular areas or fields within an interdisciplinary program may grow to assume such importance that faculty in the field wish to create a new interdisciplinary program. Similarly, the

participation of non-doctoral departments in interdisciplinary doctoral programs provides unique opportunities for those departments to strengthen and expand their own programs.

D. Student Advantages: Master's - Doctoral Path. The new interdisciplinary programs offer decided advantages to certain graduate students currently enrolled in a terminal Master's program at this university. Many of these students will now have the option of enrolling in a doctoral program at the same institution in which they begin their graduate work. For instance, Master's students specializing in polymer chemistry within the Department of Chemistry may elect to enroll in the Applied Science doctoral program.

At its meeting in April the Committee on Graduate Studies explored ways to enhance cooperation between this faculty and the School of Marine Science. As a result of this meeting, we have initiated discussions on developing joint Master's-Doctoral programs. Under this program, a student would earn a Master's degree in an established discipline such as biology or chemistry and then earn the Ph.D. in Marine Science. Such an arrangement would provide our Master's students with additional choices for earning the doctorate at William and Mary. This sort of arrangement would promote increased cooperation in research and teaching between this faculty and that of the School of Marine Science.

III. Contributions of Graduate Students to the Undergraduate Program

During the year the Dean of Graduate Studies surveyed departments to determine precisely how graduate students contribute to the undergraduate program. In two departments, Computer Science and History, advanced doctoral students have been assigned responsibility for individual courses. In Computer Science, only one course is involved, 430, Computer Languages (variable credit; pass/fail only). This course does not satisfy concentration requirements. The instructor is selected carefully, supervised closely, and well-trained. In the Department of History, approximately four sections of the introductory sequence in American history are taught by advanced graduate students. The Department has developed a program of instruction in college teaching for its graduate students, who are carefully prepared and closely supervised by the faculty. In special circumstances advanced graduate students may be assigned responsibility for other courses, when their skills match a departmental need. For instance, one graduate student who is completing a dissertation and who has extensive teaching experience, will be assigned to teach a section of History 212, Topics in American History, a course especially designed for freshmen and sophomores who have taken AP American history in high school. Both Computer Science and History have programs to prepare doctoral students for college teaching. Computer Science graduate students assist as graders and operate the Department's consulting service for CS 131, 141, and 242. (It is open Sunday through Thursday, 2:00 p.m. to midnight and Fridays, 10:00 a.m. to 3:00 p.m., but never on Saturdays.) Working as teaching assistants in a variety of courses, graduate students in history are taught how to develop a syllabus, write and grade exam questions, lecture, and meet with students, and as mentioned above, they are closely supervised when they finally do take responsibility for a section of the American history survey.

In several other departments, graduate students also contribute significantly to the undergraduate program. Physics students serve under

supervision as laboratory assistants and graders in large lecture courses. Biology graduate students, working under the close supervision of a faculty member, serve as laboratory instructors primarily in the introductory courses. They also assist in grading. In Chemistry, the primary teaching responsibility of graduate students is as laboratory assistants. At times they may grade multiple choice exams.

The English Department assigns some graduate students to the Writing Resources Center as tutors, but otherwise graduate students do not assist in the undergraduate program, as is the case in Anthropology, Government and Sociology.

Mathematics graduate students work as graders in the large classes at the 100 level and as tutors for the calculus courses. The Psychology Department makes extensive use of graduate students as assistants to the faculty, performing such tasks as scoring objective lists and record keeping for large introductory courses. Graduate students also assist in such courses as Statistics, where they occasionally teach laboratory sessions, and Experimental Psychology, where they work with undergraduates on such matters as teaching basic research skills, the use of the PC and the conventions of psychological writing. At times, graduate students may be assigned to assist undergraduates with various aspects of advanced research courses and a graduate student always is assigned to supervise the laboratory in physiological psychology.

Two graduate students from the People's Republic of China currently assist in the teaching of Chinese. One is enrolled in American Studies and the other in Sociology. In addition, a graduate student in the History Department assists in the teaching of Japanese. Arrangements for this student were made through the Hokkaido Foundation of Japan, which trains Japanese natives to assist in the teaching of Japanese to English speakers.

Departments which use graduate students in the undergraduate program recognize the need to prepare them for their responsibilities and continuously monitor their teaching apprentices. Our graduate students make major contributions to the undergraduate program.

An informal committee chaired by John Selby and working with the support of Deans Haulman and Scholnick is considering making a proposal in SCHEV's Funds for Excellence program to enable the Faculty to expand their programs of teacher preparation of graduate students. We recognize the need to train our students both in the techniques and in the ethos of college teaching.

IV. Financing Graduate Stipends

For the 1989-90 academic year state funds used to support graduate students stipends totalled \$1,213,092. An additional \$52,381 was made available through income on designated endowments and \$40,000 from funds under the Eminent Scholars program was committed. In addition, faculty in the graduate programs have brought to the university the following external funds to support graduate students:

A. Physics. Grants to the faculty enabled the Department to contribute approximately \$190,000 to support graduate students. This is approximately one-half of the Departments' total budget.

B. Computer Science. Outside grants for graduate support in the current year total \$180,992, which exceeds internal support of \$172,719.

C. Psychology. A grant from Eastern State Hospital provides approximately \$37,100 per year for graduate interns.

D. Chemistry. The Department provides approximately \$35,000 per year in external funds to support graduate students.

E. Biology. Grants provide approximately \$13,900 per year to support graduate students.

F. History. Colonial Williamsburg supplied approximately \$29,000 this year to support apprentices in the Administration of Historic Sites program.

G. Sociology. Outside grants provide approximately \$9,500 per year for the support of graduate students.

H. Mathematics. The College was one of nine universities in the country selected by the United States Army to participate in a graduate training program in Operations Research. Civilian employees are fully supported while they earn the Master of Science degree. In the first year of the program, two of the Department's ten full-time students are supported by Army funds.

Graduate departments, through grants and special arrangements with external agencies, generate approximately \$500,000 to support education in the Arts and Sciences. This amount represents approximately forty percent of the funds which come directly from the Commonwealth and reflects favorably on the high quality of our faculty and graduate students.

V. Program Evaluations

As part of its program of regular evaluations of all graduate programs, the Committee evaluated the Master's program in Psychology. The internal committee consisted of Professors Winter (Chair), Scott, and Rosen. The external consultant was Professor Lewis P. Lipsitt of Brown University. The committee will review the report in November, after which the report will be available in the graduate office and Archives. The programs in Government and Sociology will be evaluated this year.

VI. Indications of Quality: Commonwealth Fellows

Each year SCHEV holds a competition to recognize outstanding Virginians who are doctoral candidates in the six state-supported doctoral institutions. The number of students each university is allowed to nominate is based upon the proportionate size of its doctoral programs. William and Mary was allowed only 5 nominees. Forty-eight (48) students in all were considered for the twelve (12) awards. Three William and Mary doctoral students were selected for the awards, which carry a \$5,000 stipend:

Ann Smart Martin, M.A., American Studies; Ph.D. cand., History
Laurie Ann King, M.S., Computer Science; Ph.D. cand., Computer Science
Branson W. Murrill, M.S., Computer Science (UVA); Ph.D. cand., Computer Science

That William and Mary students garnered 25% of the awards while constituting approximately 10% of the nominees reflects the high quality of our graduate programs. That two of the students come from Computer Science, which began offering the Ph.D. only in 1986, demonstrates the extraordinary progress the Department has made in a short time.

VII. Conclusion

Both at the State and Federal levels, there is, we feel, an emerging consensus that graduate education must expand to meet a wide variety of needs, in basic and applied research, and in virtually every field of endeavor. The climate for graduate education is improving. With the introduction of new programs, this faculty is in an excellent position to respond to some of these needs, and to expand its graduate programs significantly. Our immediate task is to exploit fully the opportunities presented by the new interdisciplinary programs. Graduate students make vital contributions to this institution, both in research and teaching, and our programs have attracted considerable outside funds for graduate student support. In this context, it is an opportune time for this faculty to think about the evolving shape of our graduate programs, in the 1990s and beyond.

II. DATA ON STUDENTS AND DEGREES

A. ADMISSIONS - Fall Semester 1989

<u>DEPARTMENT</u>	<u>*NUMBER APPLICANTS</u>	<u>NUMBER ACCEPTED</u>	<u>NUMBER MATRICULATED</u>
AMERICAN STUDIES	71	26	15
ANTHROPOLOGY	29	13	8
APPLIED SCIENCE	1	0	0
BIOLOGY	30	9	8
CHEMISTRY	11	9	7
COMPUTER SCIENCE	143	76	13
ENGLISH	67	33	15
GOVERNMENT	48	20	8
HISTORY	112	25	22
MATHEMATICS	41	38	11
PHYSICS	120	24	12
PSYCHOLOGY	64	8	8
SOCIOLOGY	14	12	7
TOTALS	751	293	134
PSY.D. PROGRAM	263	21	10

*Number of graduate applications received in the graduate office and application fees paid or waived, for September admission only.

**Total in Consortium.

B. AVERAGE UNDERGRADUATE GRADE POINT AVERAGE
OF ENTERING STUDENTS (4.0 SCALE)

DEPARTMENT	FALL 1987	FALL 1988	FALL 1989
AMERICAN STUDIES	3.13	3.42 (22 of 23)	3.23 (14 of 15)
ANTHROPOLOGY	3.28 (6 of 9)	3.25 (8 of 10)	3.35 (7 of 8)
APPLIED SCIENCE	---	---	---
BIOLOGY	3.02	3.13	3.04
CHEMISTRY	3.04	2.65	2.73 (6 of 7)
COMPUTER SCIENCE	3.09	3.35	3.28 (12 of 13)
ENGLISH	3.51 (16 of 17)	3.31 (21 of 22)	3.32
GOVERNMENT	3.21	3.20 (7 of 9)	3.20 (6 of 8)
HISTORY	3.45 (22 of 23)	3.47	3.40 (20 of 22)
MATHEMATICS	3.06 (6 of 7)	3.64 (4 of 5)	3.08 (9 of 11)
PHYSICS	3.14 (10 of 11)	3.20	3.35 (10 of 11)
PSYCHOLOGY	3.36	3.19	3.68
PSY.D. PROGRAM	3.36	3.23	3.35
SOCIOLOGY	3.35	2.85	3.25 (6 of 7)

C. AVERAGE GRADUATE RECORD EXAMINATION SCORES
OF ENTERING STUDENTS

DEPARTMENT	FALL 1988			FALL 1989		
	VERB	MATH	ADV	VERB	MATH	ADV
AMERICAN STUDIES	624 (15 of 23)	570 (15 of 23)	---	623 (10 of 15)	563 (10 of 15)	---
ANTHROPOLOGY	510 (6 of 10)	523 (6 of 10)	---	628 (5 of 8)	586 (5 of 8)	---
APPLIED SCIENCE	---	---	---	---	---	---
BIOLOGY	594	626	700 (72%)	550	616	681 (69%)
CHEMISTRY	520 (2 of 7)	690 (2 of 7)	505 (10%) (2 of 7)	NRD	NRD	NRD
COMPUTER SCIENCE	594	688	585 (40%) (6 of 18)	499	689	NRD
ENGLISH	650 (21 of 22)	555 (21 of 22)	561 (62%) (19 of 22)	631	587	549 (55%)
GOVERNMENT	497	522	470 (56%) (1 of 9)	578	588	NRD
HISTORY	656	611	545 (69%) (13 of 14)	634	612	554 (73%) (19 of 22)
MATHEMATICS	---	---	---	NRD	NRD	NRD
PHYSICS	529 (10 of 11)	713 (10 of 11)	727 (72%)	511	704	724 (71%) (10 of 11)
PSYCHOLOGY	544	545	544 (50%) (9 of 11)	594	556	630 (74%) (6 of 8)
PSY.D. PROGRAM	656	596	624 (82%)	573	538	592 (70%)
SOCIOLOGY	523 (3 of 4)	543 (3 of 4)	480 (68%) (1 of 4)	542 (5 of 7)	532 (5 of 7)	NRD

NRD: No reliable data

D. REGISTERED REGULAR & PROVISIONAL GRADUATE STUDENTS*
Fall 1987 to Fall 1989

DEPARTMENT	FALL 1987	SPRING 1988	FALL 1988	SPRING 1989	FALL 1989
AMERICAN STUDIES	17	15	32	31	33
ANTHROPOLOGY	13	14	17	14	12
APPLIED SCIENCE	1	0	0	0	0
BIOLOGY	24	24	19	17	16
CHEMISTRY	11	11	9	8	8
COMPUTER SCIENCE	69	68	68	63	56
ENGLISH	22	28	30	29	23
GOVERNMENT	12	11	11	11	11
HISTORY	56	54	46	47	55
MATHEMATICS	12	11	15	12	17
PHYSICS	42	38	48	48	49
PSYCHOLOGY	16	13	15	14	18
SOCIOLOGY	9	8	10	10	11
A & S TOTALS	304	295	320	304	309
PSY.D. PROGRAM**	54	52	60	55	50

*Totals include both full-time and part-time registration.

**Total in Consortium.

NOTE: The Computer Science department now enrolls most of the students listed previously under Applied Science. The Applied Science program now enrolls interdisciplinary students in the sciences.

E. GRADUATE DEGREES CONFERRED 1988-89

DEPARTMENT	DEGREE	AUGUST 1988	DECEMBER 1988	MAY 1989	TOTAL
AMERICAN STUDIES	M.A.	1	2	1	4
ANTHROPOLOGY	M.A.	1	2	5	8
APPLIED SCIENCE	M.S.	0	0	0	0
BIOLOGY	M.A.	2	0	3	5
CHEMISTRY	M.A.	2	1	2	5
	M.S.	0	0	0	0
COMPUTER SCIENCE	M.S.	0	9	6	15
	Ph.D.	0	0	0	0
ENGLISH	M.A.	1	6	3	10
GOVERNMENT	M.A.	2	4	2	8
HISTORY	M.A.	3	3	1	7
	Ph.D.	0	1	0	1
MATHEMATICS	M.A.	0	0	0	0
	M.S.	1	4	4	9
PHYSICS	M.A.	0	0	0	0
	M.S.	0	2	4	6
	Ph.D.	0	1	2	3
PSYCHOLOGY	M.A.	1	1	1	3
	Psy.D.**	1	4	5	10
SOCIOLOGY	M.A.	2	0	4	6
TOTALS	M.A.	15	19	22	56
	M.S.	1	15	14	30
	Ph.D.	0	2	2	4
	Psy.D.**	1	4	5	10

*M.A. IN EDUCATION
(Secondary School Teaching)

TOTAL NUMBER OF DOCTORATES CONFERRED
AUGUST 1988 THROUGH MAY 1989

Biology	2	Arts and Sciences	- 4 Ph.D., 10 Psy.D.**
Classical Studies	1	Education	- 42 Ed.D.
English	7	Marine Science	- 6 Ph.D.
History	0		
Mathematics	1		
Museum Education	5		
Secondary School Teaching	1		
Social Studies	3		
Physical Education	0		

*Degree candidates for the M.A. in Education (Secondary School Teaching) take 12 hours of course work in Arts and Sciences.

**Total in the Consortium.

F. GRADUATE DEGREES AWARDED DURING THE LAST 10 YEARS*

(August - June)

DEPARTMENT	PROGRAM INITIATED	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	AUG. 1989	TOTAL SINCE AUG. 1979
AMERICAN STUDIES	1982-M.A.				0	1	4	5	2	3	4	2	21
ANTHROPOLOGY	1979-M.A.	0	2	2	3	5	1	4	8	4	8	0	37
APPLIED SCIENCE	1970-M.S.	7	14	9	9	10	1	2	0	0	0	0	52
BIOLOGY	1963-M.A.	10	9	11	6	5	8	7	2	7	5	4	74
CHEMISTRY	1964-M.A./M.S.	2	2	6	1	2	9	5	5	4	5	2	43
COMPUTER SCIENCE	1984-M.S.						9	10	19	10	15	3	66
	1986-Ph.D.									1	0	2	3
ENGLISH	1970-M.A.**	2	13	9	6	7	9	5	8	9	10	1	79
GOVERNMENT	1966-M.A.	3	4	5	6	1	1	5	3	6	8	3	45
HISTORY	1955-M.A.	8	5	6	10	7	11	5	14	13	7	5	91
	1967-Ph.D.	3	1	3	2	3	2	1	4	1	1	1	22
MATHEMATICS	1961-M.A./M.S.	3	5	3	5	6	6	4	7	2	9	0	50
PHYSICS	1959-M.A./M.S.	3	9	6	5	10	11	9	5	8	6	1	73
	1964-Ph.D.	2	2	5	7	6	5	6	4	5	3	2	47
PSYCHOLOGY	1953-M.A.	3	5	5	7	2	9	5	4	6	3	3	52
	1978-Psy.D.***				5	9	4	8	8	8	10	10	62
SOCIOLOGY	1967-M.A.	4	4	4	6	2	5	2	3	4	6	2	42
A & S TOTALS:	M.A./M.S.	45	72	66	64	58	84	68	80	76	86	26	725
	Ph.D.	5	3	8	9	9	7	7	8	7	4	5	72
	Psy.D.***				5	9	4	8	8	8	10	10	62

*See Table E for M.A. in Education degrees.

**Earlier program suspended in 1963.

***Total in the Consortium.

III. CURRICULUM CHANGES
Approved 1988-89

COMMITTEE ON GRADUATE STUDIES

NEW COURSE: College Course 501. English for International Students. Fall (1-3). Ms. Davis and Ms. Peterson.

AMERICAN STUDIES

NEW COURSE: 555. Colloquium. Fall and Spring (1). Mr. Brown.

COMPUTER SCIENCE

NEW COURSES: 561. Robotics. Spring, alternate years (3) Staff.

574. Advanced Computer Architecture. Fall (3) Staff.

584. Vector Processing Supercomputers. Spring, alternate years (3) Staff.

603. Advanced Analysis of Algorithms. Fall, alternate years (3) Staff.

604. Distributed Computing Systems. Fall, alternate years (3) Staff.

653. Topics in Theoretical Computer Science. Fall or Spring (1, 2, or 3 credits depending on the material) Staff.

654. Topics in Computer Systems. Fall or Spring (1, 2, or 3 credits depending on the material) Staff.

657. Topics in Computer Vision, Computer Graphics, and Image Processing. Fall or Spring (1, 2, or 3 credits depending on the material) Staff.

CHANGES: Change in titles and course descriptions:

Old: 535. Software Tools and Environments. Fall or Spring (3) Staff. Prerequisite: CS 512.
The design, construction, and integration of software tools such as pattern matchers, spelling checkers, lexical analyzers, parser generators, and configuration controllers; the command languages that make efficient use of these tools; surveys of contemporary programming environments.

New: 535. Software Engineering. Fall (3) Staff. Prerequisite: CS 512 or equivalent knowledge of programming languages. The software life cycle. Software design methodologies. Testing and maintenance. Programming teams.

COMPUTER SCIENCE (cont'd.)

Old: 555. Software Engineering. (This is now the new CS 535)

New: 555. Formal Methods in Software Engineering. Spring (3) Staff. Prerequisites: CS 512 and 523. Formal methods applicable to phases of the software life cycle. Specification methods such as algebraic, axiomatic, and functional; design paradigms such as object-oriented, information hiding, and state machines; verification methods such as reviews, proof-of-correctness, static analysis, and testing.

DELETE: 500. Advanced Programming and Data Structures
621. Knowledge-based Databases

ENGLISH

NEW COURSES: 509. Old English. Fall (3) Staff.
510. Beowulf. Spring (3) Staff.

MATHEMATICS

NEW COURSES: 520. Principles of Fortran Programming. Fall (1) Staff.
(Supplements 553. Programming Techniques in Operations Research.)

565. Models and Applications in Operations Research. Spring (3) Staff.

576. Network Optimization. Fall or Spring (3) Staff.

CHANGES: 579. Integer Program and Network Analysis is now 576 and 579, Network Optimization (new course) and Discrete Optimization.

Change in title and course description:

Old: 579. Integer Programming and Network Analysis. Discrete linear and nonlinear optimization: theory, algorithms and applications. Solution to network flow problems including maximal flow, minimal spanning tree and shortest route problems.

New: 579. Discrete Optimization. Linear and nonlinear optimization, solution algorithms (branch-and-bound, cutting plane, heuristics), and combinatorial optimization.

Change in course description:

Old: 553. Programming Techniques in Operations Research. Application of computer techniques to problems in

MATHEMATICS (cont'd.)

Operations Research, study and implementation of algorithms in areas such as PERT, dynamic programming, linear programming and search methods.

New: 553. Programming Techniques in Operations Research.
A study of Fortran programming and data structures with applications to problems in graph theory and in network location theory. An introduction to computational complexity including descriptions of polynomial time complexity and NP-completeness.

DELETE: (400-level courses cross-listed as 500-level courses)

500. Advanced Calculus
503, 504. Intermediate Analysis
505. Complex Analysis
507. Abstract Algebra
523. Introduction to Operations Research I
526. Topology
531. Finite Automata and Theory of Computation

PSYCHOLOGY

NEW COURSES: 530. Individual Differences and Testing. Fall (3) Ms.
Null.

624. Advanced Research Problems in Psychology. Spring
(3) Staff. Prerequisite: Psychology 621.

CHANGES: Change in title:

Old: 606. Proseminar in Developmental Psychology.

New: 606. Proseminar in Life Span Developmental Psychology.

Change in course description:

Old: 621. Research Problems in Psychology (now 621 and 624).
Course must be taken each semester. Research may be carried out either at the College or Eastern State Hospital and will usually consist of empirical studies, reviews, or theoretical analysis based original sources.

New: 621. Research Problems in Psychology. An introduction to research emphasizing research design, data interpretation, ethical issues and professional skills. Required of all first year students. (See 624 listed under new courses.)

Change year of internship for Psy.D. students:

PSYCHOLOGY (cont'd.)

Old: third year

New: fourth and final year of residency

Committee on Graduate Studies:

Henry Aceto, VIMS
Norman Barka, Anthropology
Donald Baxter, Government
Miles Chappell, Fine Arts
Morton Eckhause, Physics
Judy Ewell, History
Robert Gross, American Studies
Satoshi Ito, Sociology
Richard Kiefer, Chemistry
Sidney Lawrence, Mathematics
Christopher MacGowan, English
Martin Mathes, Biology
Robert Orwoll, Applied Science
Richard Prosl, Computer Science
Ellen Rosen, Psychology
Neill Watson, Clinical Psychology
Robert J. Scholnick, Chair