87-88/14

NEW COURSE PROPOSAL (rev. 9/87)

Department: Learning Center

Persons to Contact for Further Information:

Carolyn Wilkie (Director);
Carmy Carranza (Math Specialist);
Alphonse Novels (Chairperson);

Course Affected: Introduction to College Math I (LC 090)

Desired Effective Semester for Change: MAIN SESSION 1988

Approvals:

Learning Center:

[signature] -- 9/21/87
Director Date

[signature] -- 9/21/87
Chairperson Date

Division-wide Curriculum Committee:

[signature] -- 9/17/87
Chairperson Date

Vice President:

[signature] -- 9-21-87
Date

A. DESCRIPTION AND ACADEMIC NEED

1. Catalog description:

LC 090: Introduction to College Math I 3c*-01-3sh

Notes: 1) A student may not register for this course after successfully completing any course offered by the Mathematics Department, without the written approval of the Learning Center director; *2) This course carries institutional (non-graduating) credit.

Reviews basic computational skills and their applications. Includes operations with whole numbers, decimals and fractions; the concepts of ratios, proportions and percents; basic geometric principles and an introduction to algebra. This course does not meet General Education requirements. Attendance is required.

2. Syllabus: (attached; Appendix A)

3. What academic need does this course fulfill?

Both Introduction to College Math I and II are proposed for institutional credit. The courses are designed to provide the skill development prerequisite to successful completion of the University's current introductory mathematics courses.

The need for this course series is evidenced in three sources: 1) grades in the beginning level math courses presently offered; 2) faculty-expressed needs for this skill development at the level proposed; and 3) present skill levels as assessed by standardized diagnostic/placement tests.

As supplied by the Office of Institutional Research, grade data for Indiana campus students for the 1986/87 academic year in the

University's Basic Algebra (MA 010) course is presented below. It shows an unacceptably high failure (F) and withdrawal (W) rate for this introductory course, at least part of which is attributable to student underpreparedness in math.

Final Grades -- MA 010 (AY 1986/87)
(Indiana Campus, excluding LC freshmen)

Course	N	A	B	C	D	F	W	%F,W
MA 010	158	26	40	26	11	29	26	35%

Within the Learning Center freshman population, the final grade data indicates a similar need for the remedial math courses. In the past academic year, the failure and withdrawal (F/W) rate of Learning Center freshmen was essentially the same as reported above for all other Indiana campus students -- 34%.

Final Grades -- MA 010 (AY 1986/87)
(LC Freshmen)

Course	N	A	B	C	D	F	W	%F,W
MA 010	112	9	14	31	20	30	8	34%

It should be noted that tutoring was available through the Learning Center for all students enrolled in Basic Algebra last year.

The second documentation of need is provided by members of the Math Department who worked with the Learning Center summer program in Main Session 1986 and 1987. On an evaluation of the courses proposed herein, which were taught as Special Topics courses, the participating Math faculty were asked to project the percentage of University students enrolled in their Basic Algebra classes in the past two years who would have benefited from enrolling in the math series proposed before enrolling in Basic Algebra. In 1986, the six (6) faculty who could respond because they recently taught Basic Algebra indicated that an average of 60% of their students would have benefited from one or both

of the proposed courses. In 1987, the percentages ranged from 25% - 50% (rf: Appendix B).

The third source of documentation is provided through analysis of the results of the standardized diagnostic/placement tests taken by Learning Center freshmen when they matriculate at IUP. These tests are administered to students whose SAT Math scores are below 360. In the past two years, three hundred eighty-nine (389) students placed into this category and participated in the diagnostic testing. The MAPS Arithmetic and Elementary Algebra tests were used. Results of these tests, as indicated below, show that many of the students lack the computational and algebraic skills prerequisite to even the most basic courses offered through the Math Department. It is reasonable to assume that these skill deficiencies are one of the primary causes of the high attrition rates cited previously.

Mean Placement Test Results (LC Freshmen, 1986 & 1987)

	#	SAT Math Score Mean (x/800)	MAPS Arith. Mean (x/35)	MAPS El. Algebra Mean (x/35)
1986	183	315	24.2 (69%)*	14.2 (41%)*
1987	206	327	19.8 (57%)**	18.8 (54%)***

*Percentage of correct responses;
**Intro. to College Math I students only;
***Intro. to College Math II students only;

A3 (cont.) How does this course fit into the programs of the department?

This course series is the first proposed by the Learning Center Department. It directly relates to the mission of the department, which is to provide academic enhancement services. The Mathematics Department concurs with the proposed placement of this course in the Learning Center Department (rf: Appendix C).

A3 (cont.) For what clientele is the course designed?

The courses will be offered to IUP students who meet the entrance criteria defined below. However, because of constraints on personnel to teach the course during the academic year, the majority of sections will be available during the summer. In addition, because of the Learning Center Department's organizational affiliation with the Learning Center/Act 101 admissions program, students who enter IUP through that program are the primary target population for the courses.

Criteria for entrance:

a) Introduction to College Math I: 25 or below on the MAPS Arithmetic Test (or an alternate test selected in the future);

b) and recommendation of the advisor, dean, placement testing director, math or other faculty member, or personnel from the School of Continuing Education;

c) and instructor or LC Department permission;

d) and a grade not above a D in any credit-bearing course offered by the IUP Math Department, except with the written approval of the Learning Center director;

e) and no math course transferred to IUP, except with the written approval of the Learning Center director;

A3 (cont.) Is the course proposed for the General Education program?

No. The remedial math series (Introduction to College Math I & II) is proposed for institutional credit, not for graduation credit. As such, the courses are not intended for fulfillment of the current General Education program or the future Liberal Studies program.

A4: Does this course require changes in content of other existing courses?

No.

A5: Does this course follow the traditional type of offering by the department or is it a novel approach?

Both courses in the series follow the conventional time frame (i.e., semester-based) and content. It is strongly recommended that the instructional techniques used be drawn from those recommended in the literature for developmental course work: diagnostically-based instruction, small-group and individually-based learning settings, provisions for frequent feedback, self-paced and module-based instruction, etc.

A6: Has this course ever been offered at IUP on a trial basis?

Both Introduction to College Math I and II were offered as Special Topics (ED 481) offerings since the Main Session 1986. Prior to that, these courses were offered as non-credit courses in the summers of 1982-1985.

There were three significant problems associated with offering these as non-credit courses: 1) there was no formal mechanism to include them in the course loads of the students, thereby forcing the students to take full course schedules in addition to the non-credit courses; 2) during the academic year there was no mechanism for including the non-credit courses in faculty workloads; and 3) students did not approach the non-credit courses with the same seriousness as their credit-bearing courses. Offering the remedial math series as institutional credit courses will permit the courses to be counted in semester loads of both students and faculty. Students' grades earned in the institutional credit courses will be listed on their transcripts, although they will not be calculated into the quality point average. The 'reward' of the listed grade, we assume, will motivate at least some students to achieve at a higher level than if the grade were not received at all.

The evaluative data collected and analyzed so far shows very favorable results in three (3) respects: 1) the pre-post test score gains showed statistically

significant improvement over the 6-week instructional period; 2) 82% of the students who successfully completed the remedial courses and who then enrolled in Basic Algebra successfully completed Basic Algebra (earning a D or above); and, 3) student and faculty evaluations of the course were highly positive in both 1986 and 1987.

1) In both 1986 and 1987, the pre/post gains on the MAPS Arithmetic Test for the Introduction to College Math I students and on the MAPS Elementary Algebra Test for the Introduction to College Math II students were significant at the .001 level of probability (rf: Appendix D).

2) Of the LC freshmen who successfully completed Introduction to College Math II in 1986 and who then registered for Basic Algebra (the next course in the algebra sequence), there was an 82% success rate (defined as a D or above). A Chi-square analysis showed that the students who successfully completed the remedial course achieved at levels comparable to the other Indiana campus students who enrolled in Basic Algebra. [Actually, the students who completed the remedial course first performed slightly better than their Chi-square expectancies. (rf: Appendix E)]

3) One hundred ninety-five (195) students who were enrolled in the 1986 summer remedial math classes completed evaluations of the courses at the conclusion of the summer. Seventy-nine percent (79%) of the students evaluated these courses positively in answer to the question "My overall evaluation of this course is . . .," and eighty-one percent (81%) indicated that the skills/information learned through the math courses would be valuable to them in the academic year. The results were higher at the conclusion of the 1987 summer math program. At that point, 85% of the students indicated that the courses were valuable to them, and 85% indicated that the information and skills learned would benefit them during the academic year (rf: Appendix F).

In 1986, the seven (7) Mathematics Department faculty who taught the proposed math courses also completed evaluations. All of these faculty stated that the courses were needed, and they unanimously supported the course proposal submitted herein to the Curriculum Committee. The same was true of the six (6) math faculty who taught the courses in the summer session, 1987 (rf: Appendix B). (Note: Some of the math faculty who completed the survey in 1987 also completed the 1986 survey.)

A7: Is this to be a dual-level course?

No.

A8: Do other higher education institutions currently offer this course? If so, please list examples, including all such institutions in our general area.

Nationally: Higher education institutions throughout the United States offer mathematics courses of the types proposed. A national survey conducted jointly by The City University of New York and the American Mathematical Association of Two-Year Colleges (1985) indicates that remedial math courses are offered by ninety-one percent (91%; N=162) of the public four-year institutions and by seventy-four percent (74%; N=219) of the private four-year institutions that responded to the survey. In sixty-six percent (66%) of the public four-year schools, the focus of the initial course is arithmetic (Instructional Resource Center, City University of New York, 1985).

Locally: To prepare this proposal, LC faculty surveyed the extent to which courses comparable to the proposed Introduction to College Math I & II were offered by other SSHE institutions and by a sample of four-year private colleges in Western Pennsylvania. Responses were received by eleven (11) of SSHE universities and seven (7) other colleges. (Institutions contacted that did not respond to the survey included Slippery Rock, Kutztown, Penn State and The University of Pittsburgh.)

Courses comparable to Introduction to College Math I are being offered by four (4) of these eighteen (18) institutions. At two (2) of these schools (West Chester and La Roche), the courses carry graduating credit. At Bloomsburg and Cheyney, the courses carry institutional credit.

Eight (8) institutions (Shippensburg, Lock Haven, West Chester, Clarion, Bloomsburg, Waynesburg, La Roche and Mercyhurst) offer courses that are comparable to the proposed Introduction to College Math II. Three (3) institutions (California, Mansfield and Edinboro) offer courses that combine the content of the proposed Introduction to College Math I and II, and four (4) institutions (Seton Hill, Mercyhurst, St. Francis and Cheyney) offer courses in which there is an overlap of content of the proposed Introduction to College Math II and IUP's Basic Algebra (MA 010) course.

In total, fourteen (14) of the institutions surveyed offer courses that are comparable in part to at least one course in the proposed math series. Six (6) of the institutions (Lock Haven, West Chester, Clarion, Waynesburg, La Roche and Mercyhurst) award graduating credit for the courses which are comparable to Introduction to College Math II. Three institutions (California, Mansfield and

Edinboro) provide institutional credit for the courses that combine the content of the proposed Introduction to College Math I and II. Two institutions (Mercyhurst and St. Francis) provide institutional credit for the courses which combine the content of the proposed Introduction to College Math II and IUP's Basic Algebra course, while the other two institutions (Cheyney and St. Francis) award graduating credit for these courses. (A copy of the survey findings is attached as Appendix G.)

A9: Is the proposed course recommended or required by any professional society, accrediting authority, law, or other external agency? If so, please describe the circumstances.

Not applicable.

B. INTERDISCIPLINARY IMPLICATIONS:

B1: Will this course be taught by one instructor or will there be team teaching? If the latter, explain the teaching plan, and its rationale.

Each section will be taught by a single instructor.

B2: Are additional or corollary courses needed with this course, now or later? If so, explain.

a) Depending on placement test results, students may be advised to register for both courses in the proposed math sequence.

b) Neither course in the proposed sequence carries graduation credit; therefore, all students who complete the proposed courses will be required to complete the math course(s) required by their majors.

B3: What is the relationship of the content of this course to the content of courses offered by other departments? What have you discussed concerning the proposed course changes with other departments? Attach relevant memoranda which make clear their attitudes toward the proposed changes.

The two (2) courses proposed herein are intended to better prepare students for the introductory mathematics courses (most specifically, Basic Algebra) presently offered by the Mathematics Department. The Mathematics Department has been consulted throughout the development and initial piloting of this course series, and has endorsed the course series. The attached Memorandum of Understanding (rf: Appendix C) itemizes the agreement reached between the Learning Center and the Mathematics Department.

This agreement indicates that the Mathematics Department will continue to assume responsibility for math courses which carry graduating credit and the Learning Center will assume responsibility for the proposed math series which carries non-graduating credit. A committee consisting of Math and Learning Center Department representatives will be established to review this course series once it is implemented. Additionally, Math Department faculty members will teach up to ten (10) sections of the course each summer, with the understanding that the Learning Center's Math Specialist will teach one or two sections each summer and each semester.

B4: Is this course possibly applicable in a program of the School of Continuing Education directed to a clientele other than our full-time students? If so, what is the reaction of the School of Continuing Education to this course?

Yes. Students enrolling at IUP through the School of Continuing Education are potential candidates for this course series. The course proposal has received the endorsement of the School of Continuing Education, as indicated in the attachment (rf: Appendix C).

C. EVALUATION

C1: What procedures are expected to be used to evaluate student progress? (Include guidelines developed particularly for use with independent study, internships, field experiences, etc.)

Student progress will be assessed through quizzes and tests throughout the courses. In addition, we request that the University's class attendance policy currently in effect for ED 100, EN 100, MA 010 and levels I/II of foreign languages be extended to both courses in this series; i.e., that unexcused class absences may result in a grade penalty, up to and including failure in the courses.

C2: If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experiences of each student? Who will make this determination and by what procedure?

Not applicable. Variable credit is not proposed for these course.

IMPLEMENTATION

D1: What resources will be needed to teach these courses and how adequate is the current situation? If it is not adequate, what plans exist for achieving adequacy? Reply in terms of the following:

a. Faculty: No additional resources beyond present allocations are needed. Staffing patterns used in the two previous years, as the courses went through pilot curriculum development, are sufficient. (rf: Memorandum of Understanding)

B. Space and equipment: Conventional classroom space is the only space demand required by the proposed courses. Additional microcomputer facilities, while not necessary, would be helpful for implementation of computer-assisted instruction in conjunction with the courses, but the use of CAI is dependent on the individual instructor.

E. Travel funds: None required.

D2: How frequently do you expect this course to be offered? Is course particularly designed for, or restricted to, certain seasonal semesters?

The course series will be offered each semester and Main summer session. Because of the availability of an adequate number of instructional personnel in the summer Main Session, and because that is the time during which the Learning Center freshmen matriculate, the majority of the sections will be offered at that time. One to two additional sections will be offered each semester of the academic year.

D3: How many sections do you anticipate each time it is offered?

During the summer Main Session, we expect to request contracts for nine to twelve (9-12) sections of the courses, with the exact number dependent on the number of Learning Center freshmen to be placed into the courses and the number of other University students referred to or requesting the course.

During the academic year, one to two sections of the course will be taught by the Learning Center's Math Specialist.

D4: How many students do you plan to accommodate in a section of this course? Is that planned number limited by the availability of specific facilities? Explain.

Because the proposed courses require a greater degree of individualization and more frequent feedback than do some other types of courses, the institutional credit math course sections will be limited to approximately twenty (20) students each. The limitation is dependent on the nature of the courses rather than on the availability of specific facilities.

APPENDICES

Appendix A: Course syllabus for Introduction to College Math I (LC 090).

Appendix B: Responses to the survey of course need and support for the proposed course (completed by Math Department faculty who taught the proposed courses in 1986 and 1987).

Appendix C: Memorandum of Understanding between the Learning Center and the Mathematics Department; Statement of support for the proposed course series from Continuing Education.

Appendix D: Pre/post gains analyses (1986 & 1987).

Appendix E: Report on performance in Basic Algebra of students who successfully completed remedial math courses.

Appendix F: Student evaluations of the remedial math courses (1986 & 1987).

Appendix G: Survey of remedial math courses at other PA schools.

APPENDIX A

LC 090
Introduction to College Math I
3c*-01-3sh

DESCRIPTION

Notes: 1. A student may not register for this course after successfully completing any course offered by the Mathematics Department without the written approval of the Learning Center Director;

*2. This course carries institutional, non-graduating credit

3. Attendance is required.

Reviews basic computational skills and their applications. Includes operations with whole numbers, decimals and fractions; the concepts of ratios, proportions and percents; basic geometric principles; and an introduction to algebra.

TEXT

Basic College Mathematics: An Applied Approach, Aufmann/Barker.

PURPOSE OF COURSE

The purpose of this course is to strengthen students' basic computational skills and their applications.

GOALS

Upon completion of this course students will be able to:

1. Use place value, write and compare numbers, order and round numbers.
2. Add, subtract, multiply and divide using whole numbers and decimals.
3. Rename fractions and mixed numbers
4. Factor as a product of primes.
5. Simplify fractions.
6. Find the LCM and GCF.
7. Compare fractions and mixed numbers.
8. Add, subtract, multiply and divide fractions and mixed numbers.

9. Rename fractions as decimals.

10. Rename decimals as fractions.

11. Rename numbers as percents.

12. Rename percents as numbers.

13. Understand and apply the concept of percent.

14. Understand and apply the concept of proportion.

15. Understand and apply the concept of rates.

16. Compute with measures.

17. Define and describe lines, angles and geometric figures.

18. Find perimeter, area and volume.

19. Read and interpret graphs and charts.

20. Identify the order relation between two signed numbers.

21. Find absolute value and opposites.

22. Add, subtract, multiply and divide signed numbers.

23. Combine like terms and simplify.

24. Use the above concepts through applications to word problems.

GRADING BASIS

The final grade will be based on the total number of points earned converted to a percentage of the total number of points available in the course. The letter grade corresponding to the percentages earned is given below:

Letter grade	Percentages
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	Below 60

COURSE OUTLINE

Whole Numbers and Decimals

Week 1	Addition and Subtraction
Week 2	Multiplication
Week 3	Division
Week 4	Order, Exponents, and Order of Operations Agreement

Fractions and Mixed Numbers

Week 5	Least Common Multiple and Greatest Common Factor
Week 6	Addition and Subtraction
Week 7	Multiplication and Division

Percents and Proportion

Week 8	Ratios and Rates
Week 9	Proportion
Week 10	Percents and Interest

Measurement and Geometry

Week 11	Statistics and Graph Reading
Week 12	Measurement
	Angles, Lines, and Geometric Figures

Introduction to Algebra

Week 13	Introduction to Signed Numbers
Week 14	Operations with Signed Numbers
	Variable Expressions

REFERENCES

Aufmann, Richard N., and Barker, Vernon C. Basic College Mathematics: An Applied Approach. Boston, MA: Houghton Mifflin Company, 1987.

Aufmann, Richard N., and Barker, Vernon C. Essential Mathematics with Applications. Boston, MA: Houghton Mifflin Company, 1987.

Barker, Jack, Rogers, James, and Van Dyke, James. Arithmetic. Philadelphia, PA: Saunders College Publishing, 1987.

Bell, Evelyn D., Hansen, Viggo P., and Wisner, Robert J. Essential Skills for Arithmetic. New York: McGraw-Hill , Inc., 1980.

Goozner, Calman. Computational Skills for College Students. New York: Amsco College Publications, 1976.

Gossage, Loyce C. Mathematics Skill Builder. Cincinnati, OH: South-Western Publishing Company, 1977.

Hackworth, Robert D., and Howland, Joseph W. Programmed Arithmetic. Clearwater, Fla: H and H Publishing Company, Inc., 1983.

Johnston, C.L., Willis, A.T., and Hughes, G.M. Essential Arithmetic. Belmont, CA: Wadsworth Publishing Company, 1984.

Mandery, Matthew, and Schneider, Marvin. Achieving Competence in Mathematics. New York: Amsco School Publications, Inc., 1987.

McKeague, Charles P. Basic Mathematics. Belmont, CA: Wadsworth Publishing Company, 1987.

Shaw, B.R., Shelton, G., and Clarkson, S.P. Personalized Computational Skills Program: Skills and Applications. Boston, MA: Houghton Mifflin Company, 1982.

Wise, Alan. Basic Mathematics and Problem Solving. New York: Harcourt Brace Jovanovich, Inc., 1985.

Yamato, Yoshiko, and Cordon, Mary Jane. Mastering Mathematical Concepts. Orlando, FL: Academic Press, Inc., 1986.

APPENDIX B

Faculty Report and Evaluation
LC Summer Math Pilot Program - 1987

A. Course Format, Procedures, and Content

1. Briefly describe your procedures and class format. Include percent of lecture/discussion time; percent of self-instruction; percent and type of tutor usage; use of pre-tests and/or retests.

--50-60% lecture time including student responses, example problems & group work.
--4% lecture; 30% discussion; 10% self instruction; 20% tutor asssitance; retests; and weekly cumulative reviews.
--40% lecture; 60% self-work; retests; individualized help; immediate feedback on homework.
--1/3 of class time going over assignments; 30 minutes lecture time (covered 2 sections/day); remaining time for individualized help.
--Daily homework collected, corrected and returned in class; 45% work on troublesome problems; 35% lecture and discussion of new material; 20% individualized help and board work.
--Time divided between homework discussion; lecture-discussion; self instruction and individual attention.

2. Would you use these same procedures again or recommend they be used by someone else teaching the course? (6)Yes (0)No

3. What would you change, if anything?

--Make more use of out-of-class activities.
--Satisfied with this approach.
--Encourage more strongly that students see me and come to help sessions, maybe by giving 2nd retest during help sessions.
--Satisfied with my technique of lecturing along with giving individual help.
--Identify most difficult topics and emphasize them.

4. Was this course needed? (6)Yes (0)No

If so, which of the following benefits did students receive (estimate % of students)?

50-100 % Review material previously learned
80-100 % Fill in deficient areas
5-100 % Learn basically new material
20-100 % Experience new success with mathematics
30-100 % Improve attitude toward mathematics
? Other Learn to accept personal responsibility

5. Have you taught MA 010 within the past two years? (2)Yes (4)No

If so, what % of your students would have benefited from having had this course prior to MA 010? 25-50%

6. Were the course objectives/content appropriate for a summer program? (6)Yes (0)No

What changes in content/objectives would you suggest for the future? Please specify (e.g., restructuring the same content and designing a three-level sequence instead of a two-level sequence; omitting more or different units; beginning further into the material; increasing or decreasing the level of difficulty of the material).

--Suggest that we check the topics from Basic Algebra to see, in particular, if the section on algebraic fractions could be simplified for this course. Would prefer more specific objectives for this course.
--Content/objectives were clear and solid. Amount of material to be covered was reasonable. Level of difficulty seemed about right.
--No changes.
--Course began at an appropriate level. Students who passed this course should be able to handle Basic Algebra.
--Identify most difficult units and schedule more time to be spent on them; e.g., fractions, factoring, radicals.
--No changes (see B.2 - placement)

7. Suggest a program evaluation design.

--Immediate evaluation by students and faculty such as this. Follow-up using students grades in subsequent math courses. Consider using a control group which does not take ED 081.
--Track students who started in program to see how many graduate.
--Test - retest, using the cumulative final we made up.
--In addition to current pre-post tests, administer a pre-post attitude and and a pre-post anxiety test for mathematics.

8. Based on your experience with the course, could you support a course proposal to be submitted to the Curriculum Committee of the Senate during the coming year?
(6)Yes (0)No

(Our present plan is that the course would carry institutional credit which is not counted for graduation but is counted toward student and faculty full-time loads.)

General Program Effectiveness

Where appropriate, please circle your chosen ranking according to the key: SA= Strongly Agree; A= Agree; UN= Undecided; D= Disagree; SD= Strongly Disagree.

1. The text selected for this course was appropriate (SA) (A) UN D SD
(5) (1)

Would you suggest a different one? Specify.

--No.

2. Please comment on the placement procedures for this course. Specify the appropriateness of using 1) the two levels of MAPS 2) the cut-off's used to reschedule students both within the two levels and out of the top level.

--Three of my students performed at a level which would indicate that they may have been in an incorrect level, but only 1 of the 3 seemed to have academic problems.
--Seems OK.
--Placement procedures for the individual students was very effective and appropriate as were the cut-offs we used. I wouldn't change the procedure.
--Placement procedures seem good, but I would be more reluctant to make changes based on the pretest. Only in obvious extreme cases should this be done in the future.
--There were five students who should have been placed in Basic Algebra instead of College Math II. Their scores were 28,27,27,29 and 24 on the algebra pre-test. Perhaps a score of 25 should be sufficient for placement into Basic Algebra.

Specific Student Information

1. If there are students in Intro to Math II who you feel have the capabilities to do well in Elementary Functions in the Fall, please list.

Much useful information was supplied in response to these three directives. We thank you for your cooperation, your thoroughness in providing valuable details and your obvious interest in individual students.

2. If there are students for whom you recommend tutoring in conjunction with their math course in the fall, please list.

3. If there are specific students who evidenced motivational, learning, or social/personal problems of which advisors should be aware, please list and briefly explain.

D. Tutor Effectiveness

1. The use of in-class tutors was valuable for this course. (SA) A UN D SD
(6)

2. How did you make use of the tutors? Please specify.

—Individual help during class sessions
—Coached students at chalkboard work
—Homework, quiz, and test grading during class to facilitate immediate feedback
—Ran problem sessions
—Ran after class and/or afternoon help sessions
—Some teaching

3. Would you suggest any changes regarding tutor participation in the future? Please specify.

—None! I was very pleased with the set up and much appreciated the excellent work done by my tutors.
—No - except at times I felt the need for an extra day before testing.
—No changes — the tutors are a very valuable aspect of this program.
—One of my tutor's afternoon schedule for the regular tutorial program did not give him enough flexibility to work beyond the class time.

Faculty Signature

The following is a brief instrument for evaluating your individual tutors. Please indicate the name of each tutor in the space provided and rank each separately.

Tutor's name _____ Tutor's name _____

1. THE TUTOR DISPLAYED THE APPROPRIATE CONTENT KNOWLEDGE FOR HIS/HER ROLE.

(SA) (10)	(A) (2)	UN	D	SD	SA	A	UN	D	SD

2. THE TUTOR DISPLAYED THE APPROPRIATE PEDAGOGICAL SKILLS.

(SA) (8)	(A) (3)	(UN) (1)	D	SD	SA	A	UN	D	SD

3. THE TUTOR DISPLAYED THE APPROPRIATE INTERPERSONAL SKILLS.

(SA) (7)	(A) (4)	(UN) (1)	D	SD	SA	A	UN	D	SD

4. THE TUTOR DISPLAYED THE APPROPRIATE COMMUNICATION SKILLS.

(SA) (7)	(A) (5)	UN	D	SD	SA	A	UN	D	SD

5. THE TUTOR DISPLAYED TIMELY BEHAVIOR.

(SA) (7)	(A) (4)	(UN) (1)	D	SD	SA	A	UN	D	SD

6. THE TUTOR DISPLAYED RESPONSIBLE BEHAVIOR.

(SA) (11)	A	(UN) (1)	D	SD	SA	A	UN	D	SD

7. THE TUTOR SHOWED INCENTIVE.

(SA) (8)	(A) (3)	UN	(D) (1)	SD	SA	A	UN	D	SD

8. THE TUTOR DISPLAYED PROFESSIONAL CONDUCT.

(SA) (11)	(A) (1)	UN	D	SD	SA	A	UN	D	SD

9. THE TUTOR WAS AN EFFECTIVE AND APPROPRIATE ROLE MODEL FOR THE STUDENT.

(SA) (9)	(A) (3)	UN	D	SD	SA	A	UN	D	SD

10. THE TUTOR'S IMPACT ON THE STUDENT WAS POSITIVE.

(SA) (8)	(A) (4)	UN	D	SD	SA	A	UN	D	SD

ADD ANY ADDITIONAL COMMENTS OR INFORMATION ON THE BACK.

As you can see, tutors received very high marks from you on all of the above, with the exception of one tutor who, incidentally, was not a trained member of our tutorial staff.

1986

INDIANA UNIVERSITY OF PENNSYLVANIA • INDIANA, PENNSYLVANIA 15705
Learning Assistance Center • 202 Pratt Hall • (412) 357-2729

SUBJECT: Summary of Faculty Report and Evaluation for LC Summer Math Pilot Program

TO: Mr. John Busovicki
Dr. Donald Duncan
Mr. Charles Maderer
Dr. Jack Shelper
Dr. Merle Stilwell
Dr. Richard Wolfe
Dr. Melvin Woodard

FROM: Carmy Carranza
Tutorial Coordinator and Math Specialist

DATE:

Enclosed is my best attempt at summarizing the Faculty Report and Evaluation form you each submitted for our pilot math program this summer.

Where you provided written descriptions and/or comments, I listed those, sometimes using your own wording, sometimes paraphrasing. Similar or duplicate comments were entered only once.

Since the form was developed in order to receive input from you, the math faculty, my own report is not part of this summary. However, I did enclose the results of a student evaluation completed in my two sections of Intro to Math I for your information.

CC/jms

Enclosure

cc Dr. Steven Ender
Ms. Carolyn Wilkie
Dr. John Broughton
Dr. Charles Fuget
Mr. Alphonse Novels

Summary

Faculty Report and Evaluation
LC Summer Math Pilot Program

A. Course Format, Procedures, and Content

1. Briefly describe your procedures and class format. Include percent of lecture/discussion time; percent of self-instruction; percent and type of tutor usage; use of pre-tests and/or retests.

--50-60% lecture/40-50% individual work. Slowest paced group assigned to work separately w/tutor.
--25% lecture/75% self-paced w/retests and some external pacing. Completion of all units and high grades earned an A or B; 70% mastery earned a C.
--60% lecture/40% self-instruction w/tutor assistance; homework collected and graded.
--40% lecture/20% self-instruction/30% self-paced w/ tutor assistance/10% question-answer. Retests on poor results.
--50% lecture/20% oral & written quizzing/15% student practice on new work/15% assignment review.
--10 pt. daily quiz, chapter tests, homework assignment review, lecture, individual help.
--1/2 hr.-teacher introduced new material while tutors graded and returned homework.
15 min.-practice exercises assigned & monitored, homework questions answered individually, new assignment made & work monitored.
15 min.-more new material presented.
15 min.-more practice exercises assigned and monitored
15 min.-ditto--or more new material presented.

2. Would you use these same procedures again or recommend they be used by someone else teaching the course? (7)Yes ( )No

3. What would you change, if anything?

--more work-time available in class, after the lecture, for students to "do" math, with consistent professor & tutor supervision.
--adjust the pace, cover less in more depth
--provide an opportunity for retests
--less lecture, more individual in-class work.
--keep my minimum requirements for an A or B (completion of all units with high grades), but reconsider those for a C (70% master of units 1-6 or completion of at least 3 units with 70% or better).
--move more quickly in the beginning & be more demanding from the beginning.

4. Was this course needed? (7)Yes ( )No

If so, which of the following benefits did students receive (estimate % of students)?

(Averages)

55% Review material previously learned
54% Fill in deficient areas
32% Learn basically new material
50% Experience new success with mathematics
44% Improve attitude toward mathematics
_____ Other_____

5. Have you taught MA 010 within the past two years? (4)Yes (3)No

If so, what % of your students would have benefited from having had this course prior to MA 010? 60% (Average)

6. Were the course objectives/content appropriate for a summer program?
(7)Yes ( )No

What changes in content/objectives would you suggest for the future? Please specify (e.g., restructuring the same content and designing a three-level sequence instead of a two-level sequence; omitting more or different units; beginning further into the material; increasing or decreasing the level of difficulty of the material).

--eliminate chapter 11 (radical expressions) completely.
--The content covered in MA I & II should impact favorably on the MA010 course, upgrading it's level to where it should be and providing a more supportive environment for the better students.
--the three-level sequence (I,II, 010) is appropriate.
--The amount of content may have been 15-20% over what students with good outside effort could handle. Pare it down somewhat to insure mastery.
--Add a short review of arithmetic (1wk.) to the Math II course (and even to 010).

7. Suggest a program evaluation design.

--an analysis based on the pre-post test data collected.
--follow-up these courses with test results using the University's Mathematics Placement Test.
--use pre-post tests, but design our own tests based on the course content, rather than depending on what is tested in the MAPS.
--continue to receive instructor feedback (track students).
--design another test (not multiple-choice as the MAPS is), and also include the post-test results in the final grade data to insure student participation and strong effort.
--1. Use pre-post testing with both an experimental and control group.
2. Use MAPS plus a final designed by the textbook author.
3. Track students throughout subsequent math courses via final grades and/or standardized finals.
4. Also measure attitudes.

8. Based on your experience with the course, could you support a course proposal to be submitted to the Curriculum Committee of the Senate during the coming year?
(7)Yes ( )No

(Our present plan is that the course would carry institutional credit which is not counted for graduation but is counted toward student and faculty full-time loads.)

Five people responded with simply a "yes". Two qualified their response as follows:

--Yes, if we are going to admit students with math skills like those encountered in this program.

--Yes, especially when followed by MA010. The two together should even improve the work/study habits necessary for success in other non-mathematics courses.

B. General Program Effectiveness

Where appropriate, please circle your chosen ranking according to the key: SA= Strongly Agree; A= Agree; UN= Undecided; D= Disagree; SD= Strongly Disagree.

1. The text selected for this course was appropriate (SA) (A) UN D SD
(5) (2)

Would you suggest a different one? Specify.

No one did.

2. Please comment on the placement procedures for this course. Specify the appropriateness of using 1) the two levels of MAPS 2) the cut-off's used to reschedule students both within the two levels and out of the top level.

--"satisfied with both the MAPS test and the cut-off's we used for the various levels."
--"very satisfied"
--"commendable job"
--"I doubt we could have done much better."
--excellent decisions on placements made out of Math II into MA010.
--Students who did poorly were not necessarily misplaced; their problems were motivational in nature.

C. Specific Student Information

1. If there are students in Intro to Math II who you feel have the capabilities to do well in Elementary Functions in the Fall, please list.

Most submitted entries for each of these three categories of student. Thank you.

2. If there are students for whom you recommend tutoring in conjunction with their math course in the fall, please list.

3. If there are specific students who evidenced motivational, learning, or social/personal problems of which advisors should be aware, please list and briefly explain.

D. Tutor Effectiveness

(6) — one instructor did not use tutors.

1. The use of in-class tutors was valuable for this course. (SA) A UN D SD

2. How did you make use of the tutors? Please specify.

--assisted students in-class (aids to self-paced study)
--graded homework and tests
--facilitated the process of giving immediate feedback on homework and tests
--conducted extra help sessions before exams
--used as resource persons outside of class

3. Would you suggest any changes regarding tutor participation in the future? Please specify.

No changes
"liked their involvement"
"recommend even greater tutor interaction with students"

Faculty Signature

Following is a brief instrument for evaluating your individual tutors. Please indicate the name of each tutor in the space provided and rank each separately.

Tutor Name	Tutor Name
1. THE TUTOR DISPLAYED THE APPROPRIATE CONTENT KNOWLEDGE FOR HIS/HER ROLE.	
SA A UN D SD	(SA) (A) UN D SD (9) (3)
2. THE TUTOR DISPLAYED THE APPROPRIATE PEDAGOGICAL SKILLS.	
SA A UN D SD	(SA) (A) (UN) D SD (6) (4) (2)
3. THE TUTOR DISPLAYED THE APPROPRIATE INTERPERSONAL SKILLS.	
SA A UN D SD	(SA) (A) UN D SD (10) (2)
4. THE TUTOR DISPLAYED THE APPROPRIATE COMMUNICATION SKILLS.	
SA A UN D SD	(SA) (A) UN D SD (8) (4)
5. THE TUTOR DISPLAYED TIMELY BEHAVIOR.	
SA A UN D SD	(SA) (A) (UN) D SD (7) (4) (1)
6. THE TUTOR DISPLAYED RESPONSIBLE BEHAVIOR.	
SA A UN D SD	(SA) (A) UN D SD (8) (3)
7. THE TUTOR SHOWED INCENTIVE.	
SA A UN D SD	(SA) (A) UN D SD (8) (4)
8. THE TUTOR DISPLAYED PROFESSIONAL CONDUCT.	
SA A UN D SD	(SA) (A) (UN) D SD (7) (3) (2)
9. THE TUTOR WAS AN EFFECTIVE AND APPROPRIATE ROLE MODEL FOR THE STUDENT.	
SA A UN D SD	(SA) (A) UN D SD (10) (2)
10. THE TUTOR'S IMPACT ON THE STUDENT WAS POSITIVE.	
SA A UN D SD	(SA) A UN D SD (12)

ADD ANY ADDITIONAL COMMENTS OR INFORMATION ON THE BACK.

The numbers in the right-hand column above show the number of responses given, by rating, for the twelve (12) separate in-class tutors evaluated.

APPENDIX C

MEMORANDUM OF UNDERSTANDING

BETWEEN

LEARNING CENTER

AND

MATHEMATICS DEPARTMENT

In order to facilitate the sponsorship of remedial, institutional credit bearing, mathematics courses to be offered through the Learning Center (LC), the below listed issues have been discussed and approved by both the Learning Center and the Mathematics Department.

1. Any mathematics courses that carry graduating credit are the responsibility of the Mathematics Department.

2. Any remedial mathematics courses that carry institutional credit are the responsibility of the Learning Center.

3. A Remedial Mathematics Advisory Council, consisting of 2 or 3 full time faculty from the Mathematics Department and the LC Mathematics Specialist, will be established. Its charge is to advise on the preparation of curricula for all remedial mathematics courses offered by the LC and to oversee and monitor such curricula in an ongoing manner.

4. The Chairman of the Mathematics Department will appoint the members of the Remedial Mathematics Advisory Council from the Mathematics Department.

5. Two (2) remedial mathematics courses will be submitted by the LC to the University Curriculum Committee for Senate approval (see attached syllabi). These courses, Introduction to Mathematics I and II, will bear institutional credit that will not count toward the 124 credit hours needed for graduation.

6. The LC Mathematics Specialist will be responsible for the coordination and implementation of the summer remedial mathematics program offered through the LC. This program will offer remedial mathematics courses which carry institutional credit only.

7. The LC Mathematics Specialist will teach one or two sections of the remedial mathematics courses offered through the LC summer program.

8. The Mathematics Department will provide faculty to teach the remainder of the remedial mathematics courses offered through the LC summer program with the understanding that such commitment by the Mathematics Department will not exceed ten (10) such institutional credit classes.

9. If additional sections are needed beyond those identified in Sections 7 and 8 of this agreement, the LC can seek instructors from sources other than the Mathematics Department. Minimum qualifications for such instructors will be a Bachelors degree in Mathematics or Mathematics Education. Any search committee for such instructors will include at least one member of the Mathematics Department who also serves on the Remedial Mathematics Advisory Council.

10. The LC Mathematics Specialist will teach sections of the remedial mathematics courses which carry institutional credit during the fall and spring semesters of an academic year.

11. In the event that IUP, during the course of this agreement, determines that institutional credit hours are appropriate for graduating credit, then all remedial mathematics courses bearing institutional credit become the responsibility of the Mathematics Department.

12. This agreement becomes effective January 1, 1987 and expires December 31, 1989.

13. This agreement will be evaluated by the LC and the Mathematics Department during the period October 1, 1989 to December 1, 1989. If warranted through mutual interest, this agreement or a successor constructed through negotiation may take effect on January 1, 1990.

Approved by the Mathematics Department on October 23, 1986.

For the Mathematics Department:

John Broughton
John Broughton, Chairman
Mathematics Department

October 24, 1986
Date

Charles R Fuget
Charles Fuget, Dean
College of Natural
Science and Mathematics

10/24/86
Date

Approved by the Learning Center on 10/27/86.

For the Learning Center:

Alphonse N. Novels
Alphonse Novels, Chairman
Learning Center

10/27/86
Date

Steven C. Ender
Steven Ender, Assistant
Vice President for
Student Affairs

10/27/86
Date

INDIANA UNIVERSITY OF PENNSYLVANIA
INDIANA, PA 15705
October 29, 1986

SUBJECT: Proposed Remedial Math Series

TO: Carolyn Wilkie, Director
Learning Center
ACT 101 Program

FROM: Edward W. Nardi, Director EWN
Division of Credit Programs
School of Continuing Education

Having reviewed the syllabi for Introduction to College Math I and for Introduction to College Math II, I offer the endorsement of the School of Continuing Education in support of both course proposals.

I believe the availability of these two courses will be a valuable resource to specific adult students in making the transition back into the academic environment. Historically, many adults have experienced a decline in math skills over the years. This tends to cause a high degree of anxiety in some returning adults. These two courses can assist in making that transition easier.

I trust the Senate Curriculum Committee will look favorably on these two course proposals. Please let me know when they become available. Thank you.

EWN:clf

APPENDIX D

1987

Table

Pre/Post Differences on MAPS Arithmetic
& Elementary Algebra Tests

TEST	N	MEAN	ST. DEV.	DIFF. MEANS	T-VALUE	SIGN. LEVEL
Arith. Pre	34	19.82	4.15	6.74	11.85	0.0001
Arith. Post	34	26.56	4.31			
El. Alg. Pre	172	18.84	5.52	7.17	21.35	0.0001
El. Alg. Post	172	26.01	4.86			

Pre/Post Differences on MAPS Arithmetic & Elementary Algebra Tests

		Arithmetic Pre	Arithmetic Post	El. Algebra Pre	El. Algebra Post
Math I	N	46	46	46	46
	Mean	18.7	25.8	10.6	12.7
	MS Between	1162.27		102.27	
	MS Within	19.47		19.11	
	F	59.71*		5.35**	
MathII	N	113	113	111	111
	Mean	26.2	28.5	15.6	23.5
	MS Between	315.44		3433.01	
	MS Within	12.10		27.59	
	F	26.07*		124.42*	

*$p < .001$
**$p < .05$

APPENDIX E

Effectiveness of the Remedial Math Courses

Sep. 21, 1987

This is a report on the analysis of the effectiveness of the remedial math courses, Introduction to College Math I/II, offered by the Learning Center/Act 101.

In order to carry out the analysis, it was assumed that if the remedial courses are indeed effective, the students who successfully complete them will be as ready to take regular math courses as any other IUP students. This assumption leads to a hypothesis which states that students who successfully completed the remedial courses, as a whole, performed just as well in regular math courses in their subsequent semesters as those students who took regular math courses in the same time period but had not taken the remedial courses. Through this reasoning, the problem of measuring the effectiveness of the remedial courses has been reduced to a comparison of performance in regular math courses between the two groups of students described above.

The following is the actual analyses of the data. Row R represents the students who successfully completed the remedial courses (i.e., received A, B, or C) in the summer of 1986 and took Basic Algebra (MA 010) in subsequent semesters (either Fall 1986 or Spring 1987). Row NR represents the students who did not take the remedial courses and took Basic Algebra in Fall 1986 or Spring 1987. The scope of this analysis is limited to Basic Algebra since preparing students for it is the primary focus of the remedial courses. The performance of the students in Basic Algebra was classified as either Pass or Fail. Two analyses were carried out, one with Fail being defined as a F grade while the other defined Fail as a D or an F grade. Each analysis employs a chi-square test, which compares the actual number of studetns who belong to a particular category, say the students who had successfully completed the remedial math courses and subsequently passed Basic Algebra, with the number of students expected for that category (shown inside parentheses in the tables below). This expected number signifies the number of students who should belong to that category if the hypothesis -- there is no difference between the two groups (those who successfully completed the remedial courses and those who did not take the remedial courses) in their performance in Basic Algebra -- is correct. (For example, in Analysis 1, we expected about 30 of 39 students who had successfully completed the remedial courses and took

Basic Algebra in subsequent semesters to pass Basic Algebra while 32 of them actually did so.)

Analysis 1:

Performance in Basic Algebra

	Pass	Fail (F only)	Total
R	32 (30.35)	7 (8.65)	39
NR	140 (141.65)	42 (40.35)	182
Total	143	78	221

Chi-square (with Yate's correction) = .239

Significance >> .30

Analysis 2:

Performance in Basic Algebra

	Pass	Fail (D or F)	Total
R	20 (25.23)	19 (13.77)	39
NR	123 (117.76)	59 (64.24)	182
Total	143	78	221

Chi-square (with Yate's correction) = 3.05

.05 < Significance < .10

Since the significance of the above analysis is greater than .05 in either case, we fail to reject the hypothesis. Therefore, we may conclude that the remedial math courses are indeed effective.

APPENDIX F

(1987)

rf: #6465

INTRODUCTION TO COLLEGE MATH I/II

SUMMER PROGRAM EVALUATION

The following represent the cummulative results on the Math Improvement portion of the Summer Program Evaluation for 1987.

SA = Strongly Agree
A = Agree
SD = Strongly Disagree
D = Disagree
U = Undecided
NA = Not Applicable

N = 178

55. The rate at which material was presented was appropriate.

SA = 30%; A = 44%; D = 22%; SD = 4%; UN = 0%

56. The level of difficulty of this course was appropriate.

SA = 24%; A = 47%; D = 17%; SD = 9%; UN = 2%

57. The opportunities for discussion and/or questions were appropriate.

SA = 34%; A = 53%; D = 9%; SD = 2%; UN = 1%

58. The professor's method of presenting material was appropriate for this course.

SA = 37%; A = 47%; D = 11%; SD = 5%; UN = 0%

59. The professor's attitude and enthusiasm motivated me to want to achieve the course goals.

SA = 38%; A = 40%; D = 14%; SD = 7%; UN = 1%

60. The in-class tutors' attitudes and enthusiasm motivated me to want to achieve the course goals.

SA = 32%; A = 39%; D = 13%; SD = 8%; UN = 3%

61. The assistance provided by the in-class tutors was valuable.

SA = 39%; A = 42%; D = 7%; SD = 5%; UN = 2%

62. I would have preferred less emphasis on individual work.

SA = 9%; A = 26%; D = 41%; SD = 17%; UN = 6%

63. I would have preferred greater emphasis on individual work.

SA = 20%; A = 39%; D = 24%; SD = 8%; UN = 8%

64. The information/skills I learned through this course will benefit me during the academic year.

SA = 35%; A = 50%; D = 7%; SD = 4%; UN = 3%

65. Overall, this course was valuable for me.

SA = 43%; A = 42%; D = 10%; SD = 3%; UN = 2%

66. I consider myself to have "math anxiety."

(If you are interested in participating in math anxiety sessions in the Fall semester, please complete the form attached to the end of this evaluation and return it with your answer sheet.) Forty-four (44) students responded.

SA = 19%; A = 27%; D = 24%; SD = 24%; UN = 6%

1986

Nf: H 56+57

IV. Math Improvement Program

Please answer the following items if you were enrolled in Introduction to College Math I or II this summer. If you were not enrolled in either of these courses, please mark "F" for items 51-69. Key A=Strongly Agree (5); B=Agree (4); C=Disagree (3); D=Strongly Disagree (2); E=Not Applicable (1); F=Not Enrolled (0).

	A	B	C	D	E	
51. I understand why I was assigned to this course.	82: 42%	74: 38%	28: 14%	11: 6%	4: --	3.2
52. The rate at which material was presented was appropriate.	32: 16%	86: 44%	39: 20%	39: 20%	3: --	2.5
53. The level of difficulty of this course was appropriate.	35: 18%	107: 55%	37: 19%	15: 8%	3: --	2.8
54. The opportunities for discussion and/or questions were appropriate.	40: 20%	115: 59%	32: 16%	9: 5%	3: --	2.9
55. The instructor's method of presenting material was appropriate for this course.	48: 25%	99: 51%	36: 18%	12: 6%	3: --	2.9
56. The information/skills I learned through this course will benefit me during the academic year.	51: 26%	106: 55%	27: 14%	9: 5%	3: --	3.0
57. My overall evaluation of this course is positive.	51: 27%	99: 52%	32: 17%	10: 5%	4: --	3.0
58. I would have preferred less emphasis on individual work.	18: 9%	58: 30%	100: 52%	16: 8%	5: --	2.4
59. I would have preferred greater emphasis on individual work.	40: 21%	73: 38%	64: 33%	16: 8%	5: --	2.7
60. Given my academic background and the requirements for my major, I was appropriately scheduled for this course.	43: 23%	93: 49%	37: 19%	17: 9%	6: --	2.9
61. I was motivated by working with the computer.	18: 23%	21: 27%	25: 32%	14: 18%	96: --	2.2
62. I learned more by working with the computer than I would have if I had not had computer-assisted instruction.	16: 21%	19: 25%	29: 39%	11: 15%	99: --	2.5
63. I plan to use the Learning Center's computer-assisted tutorial instruction for my math classes next year.	32: 28%	52: 46%	23: 20%	6: 5%	65: --	3.0
64. The instructor's attitude and enthusiasm were motivational.	48: 26%	93: 51%	30: 16%	12: 7%	8: --	3.0
65. The in-class tutors' attitudes and enthusiasm were motivational.	54: 32%	74: 44%	28: 17%	12: 7%	23: --	3.0
66. The assistance provided by the in-class tutors was valuable.	57: 35%	86: 53%	14: 9%	6: 4%	25: --	3.2
67. I plan to use the LC tutorial services for my math classes this year.	80: 45%	75: 43%	15: 9%	6: 3%	13: --	3.3
68. I consider myself to have "math anxiety."	42: 23%	62: 34%	64: 35%	14: 8%	7: --	2.7
69. I am interested in participating in a series of workshops to overcome math anxiety.	27: 16%	65: 37%	68: 39%	14: 8%	15: --	2.6

APPENDIX G

STUDY OF DEVELOPMENTAL/REMEDIAL MATH COURSES

IUP

NSTITUTION	Course LC 090 # CREDITS	INST.	GRAD.	Course LC 095 # CREDITS	INST.	GRAD.	Course MA 010 # CREDITS	INST.	GRAD.
Hippensburg				3	3				
Millersville							3		3
Lockhaven	0			3		3	3		3
West Chester	3		3	3		3	3		3
Clarion				3		3			
Bloomsburg	2	2		2	2		2	2	
Cheyney	3	3					3 cr.-Grad.		
California			3 cr.-Inst.						
Mansfield			3 cr.-Inst.						
Edinboro			3 cr.-Inst.						
Waynesburg				3		3	3		3
Point Park							4		4
Robert Morris									

IUP

INSTITUTION	Course LC 090 # CREDITS	INST.	GRAD.		Course LC 095 # CREDITS	INST.	GRAD.		Course MA 010 # CREDITS	INST.	GRAD.
LaRoche College	3		3		3		3				
St. Francis								3 cr.-Grad.			
Mercy Hurst					3		3	3 cr.-Inst.			
Seton Hill								3 cr.-Inst.			

11/14/86