

UWUCC



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Action-Date: App. 11/11/97

CURRICULUM PROPOSAL COVER SHEET *Senate app. 12/2/97*
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Gerald Buriok Phone 2608
Department Mathematics

II. PROPOSAL TYPE (Check All-Appropriate Lines)

COURSE MA 105 College Algebra
Suggested 20 character title

New Course* MA 105 College Algebra
Course Number and Full Title

_____ **Course Revision** _____
Course Number and Full Title

Liberal Studies Approval + MA 105 College Algebra
for new or existing course Course Number and Full Title

_____ **Course Deletion** _____
Course Number and Full Title

_____ **Number and/or Title Change** _____
Old Number and/or Full Old Title

New Number and/or Full New Title

_____ **Course or Catalog Description Change** _____
Course Number and Full Title

_____ **PROGRAM:** _____ **Major** _____ **Minor** _____ **Track**

_____ **New Program*** _____
Program Name

_____ **Program Revision*** _____
Program Name

_____ **Program Deletion*** _____
Program Name

_____ **Title Change** _____
Old Program Name

New Program Name

III. Approvals (signatures and date)

[Signature] 2-11-97
Department Curriculum Committee

[Signature] 2-10-97
Department Chair

[Signature] 3-19-97
College Curriculum Committee

[Signature] 3/19/97
College Dean

[Signature]
+ Director of Liberal Studies (where applicable)

[Signature]
*Provost (where applicable)

I. Catalog Description

MA 105 College Algebra	3 credits 3 lecture hours (3c-0l-3sh)
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Prerequisites: MA 100 or equivalent high school preparation.

Note: A student may not take MA 105 College Algebra after successfully completing a calculus course or MA 110 Elementary Functions without the written approval of the mathematics department chairperson.

To prepare students for the study of calculus for business, natural and social sciences. Topics include a detailed study of polynomial, exponential, and logarithmic functions. This course is designed primarily for students planning to take MA 121: Calculus for Business, Natural, and Social Sciences.

II. Course Objectives

1. Students will understand and take advantage of pattern recognition in the study of mathematics.
2. Students will review some basic concepts of algebra.
3. Students will make a careful study of linear functions and their application to business, economics, and the physical and social sciences.
4. Students will make a careful study of functions in general, including polynomial, rational, exponential, and logarithmic functions, and their application to business, economics, and the physical and social sciences.
5. Students will understand how to interpret functions expressed graphically.
6. Students will develop an appreciation for the nature and power of (even elementary) mathematics.
7. Students will develop and extend already existing intermediate algebra skills in problem solving.
8. Students will learn to communicate clearly (reading, writing, listening, speaking) using the language of mathematics.
9. Students will be exposed to certain basic problem solving skills that are useful in and of themselves and in addition will be used in the study of the calculus.
10. Students will become confident in their mathematical abilities.
11. Students will use the skills learned in this course in the study of the calculus.

III. Course Outline

A. Review of Algebra (9 hours)

1. Rational and Irrational Numbers; Decimal Approximation
2. Exponents and Radicals
3. Algebra of Polynomials: Factoring
4. Fractional Expressions
5. Linear Equations and Inequalities
6. Quadratic Equations and Inequalities

B. Some Fundamentals (6 hours)

1. Coordinate Geometry

- a. Cartesian Coordinate System
 - i. Pythagorean Theorem
- b. Equations and Graphs
- c. Symmetry
 - i. Tests for symmetry

2. Lines

- a. Slope of a Line
- b. Point-slope form
- c. Slope intercept form
- d. Vertical and horizontal lines
- e. Parallel and perpendicular lines
- f. Review: Solving linear equations
- g. Review: Solving linear inequalities.

3. Problem Solving

- a. Read and understand the problem (diagram, unknowns)
- b. Plan
- c. Carry out the plan
- d. Look back (check for errors, look at method of solution)

C. Functions (11 hours)

1. Definition

- a. Domain and Range

2. Graphs of Functions

- a. Increasing and Decreasing Functions
- b. Even and Odd Functions, Symmetry
- c. Piecewise-defined Functions
- d. Intercepts

3. Applied Functions

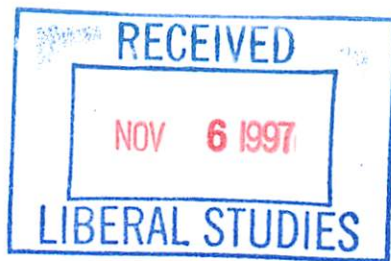
- a. Problem Solving
- b. Direct and Inverse Variation

4. Transformation of Functions

- a. Vertical Shift
- b. Horizontal Shift

- c. Reflection
 - d. Dilations and Compressions (in both x and y directions).
 - 5. Quadratic Functions
 - a. Use of the form $a(x - h)^2 + k$
 - i. maxima/minima
 - 6. Combining functions
 - a. Addition, subtraction, multiplication, division
 - b. Function Composition
 - c. Graph of a Function Composed with the Absolute Value Function
 - 7. One to One Functions: Inverses
 - a. Definition of One to One/Horizontal Line Test
 - b. Inverse Functions
 - i. Definition
 - ii. Finding Inverse Functions
 - iii. Graphing Inverse Functions
- D. Exponential and Logarithmic Functions (11 hours)**
- 1. Definition of Exponential Functions
 - a. Domain and Range
 - b. Asymptote
 - c. The base
 - d. Solving Exponential Equations
 - 2. Graphs of Exponential Functions
 - 3. Applications of Exponential Functions
 - a. Growth and Decay
 - b. Compound Interest
 - 4. Logarithmic Functions
 - a. Domain and Range
 - b. Asymptote
 - c. Natural Logarithm Function
 - d. Inverse of Exponential Functions
 - 5. Laws of Logarithms
 - a. Change of Base Formula
 - b. Solving Logarithmic and Exponential Equations
 - 6. Applications of Logarithms
 - a. Growth and Decay
 - b. Compound Interest
 - c. Newton's Law of Cooling
 - d. Logarithmic Scales
 - i. The pH Scale
 - ii. The Richter Scale
 - iii. The Decibel Scale

The syllabus covers 37 hours. The remaining 5 hours are for review and tests.



IV. Evaluation Methods

The final grade for the course will be determined as follows:

50% Tests. Three tests will include problems on basic competency and critical thinking.

20% Final Examination. The final examination will be comprehensive and cover both basic competency and critical thinking.

30% Homework and Quizzes These will cover textbook assignments.

Suggested Grading Scale

Points will be assigned to each of the categories above in accordance with the stated percentages. Grades will be assigned according to the following scale for percentage of total points:

90% and up A, 80% to <90% B, 70% to <80% C, 60% to <70% D, below 60% F.

V. Required Textbook

Dugopolski, Mark, College Algebra. Reading, Massachusetts: Addison Wesley Publishing Company, 1996.

VI. Special Resource Requirements

Some instructors may require students to purchase a graphing calculator.

VII. Bibliography

Demana, Franklin, and Bert K. Waits. Precalculus: Functions and Graphs. Reading, Massachusetts: Addison Wesley Publishing Company, 1997

Hughes-Hallett, Deborah, et al. Applied Calculus for Business, Social Sciences, and Life Sciences. New York: John Wiley & Sons, Inc., 1996

Committee on the Mathematical Sciences in the Year 2000. Everybody counts : a report to the nation on the future of mathematics education. Washington, D.C. : National Academy Press, 1989.

Course Analysis Questionnaire

Section A: Details of the Course

A1 How does this course fit into the programs of the department? For what students is the course designed? (majors, students in other majors, liberal studies).

The Mathematics Department offers three calculus sequences. These are:
MA 121/122 Calculus Business, Natural, and Social Sciences;
MA 123/124 Calculus for Physics and Chemistry;
MA 127/128/227 Calculus.

Although these calculus courses are quite different in their level of expectation, all three have the same prerequisite, namely MA 110 Elementary Functions. MA 105 College Algebra is being introduced as a replacement for MA 110 for students who are required to complete MA 121 rather than the more demanding courses, MA 123 and MA 127. With the addition of this new course, we will be able to concentrate on the specific topics that will better prepare students for the calculus course they are required to take.

A2 Does this course require changes in the content of existing courses or requirements for a program? If catalog descriptions of other courses of department programs must be changed as a result of the adoption of this course, please submit as separate proposals all other changes in courses and or program requirements.

This course does not require changes in the content of any existing courses or requirements for a program. The catalog description for MA 121 will be changed to "MA 105 or MA 110 or equivalent high school preparation" from "MA 110 or equivalent high school preparation."

A3 Has this course ever been offered at ILP on a trial basis (e.g. as a special topic)? If so, explain the details of the offering.

Discussions between the Mathematics Department and the College of Business have been going on for several years regarding the courses MA 110 and MA 121. After an unsuccessful experiment with an alternative sequence during the 1995-96 academic year, both parties agreed to offer the MA 105 as MA 281 Special Topics during both semesters of the 1996-97 academic year. During this time, only students from the College of Business were permitted to register for MA 281. Once MA 105 is approved, other departments in which majors are required to complete MA 121 will be informed that MA 105 should replace MA 110 as the prerequisite for MA 121.

A4 Is this course to be a dual-level course? If so, what is the approval status at the graduate level?

This course is not to be a dual-level course.

A5 If this course may be taken for variable credit, what criteria will be used to relate credits to the learning experience of each student? Who will make this determination and by what procedures.

This course may not be taken for variable credit.

A6 Do other higher education institutions currently offer this course? If so, please list examples.

Many community colleges, colleges, and universities offer courses similar to this proposed course. The articulation agreement between Pennsylvania community colleges and SSHE universities shows that Westmoreland County Community College (MA 157), Community College of Allegheny County (MA 142), Clarion U. Of PA (MA 110), Edinboro U. Of PA (MA 204), Slippery Rock U. Of PA (MA 111), and California U. Of PA (MA 181) offer courses equivalent to the proposed course.

A7 Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency? If so, please provide documentation. Explain why this content or these skills cannot be incorporated into an existing course.

The content of the proposed course is not required by a professional society, accrediting authority, law, or external agency. The purpose of this course is to help prepare students for the calculus course, MA 121 Calculus I Business, Natural, and Social Sciences. Although some of the content of this course overlaps with MA 110 Elementary Functions, the proposed course will start at a more basic level than MA 110, provide time for review of basic algebra skills, and proceed at a more casual pace.

Section 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.

This course will be taught by one instructor

B2 What is the relationship between the content of this course and the content of courses

offered by other departments? Summarize your discussions (with other departments) concerning the proposed changes and indicate how any conflicts have been resolved. Please attach relevant memoranda from these departments which clarify their attitudes toward the proposed change(s)?

There is no relationship between this course and the content of courses offered by other departments.

B3 Will seats in this course be made available to students in the School of Continuing Education?

Yes.

Section C: Implementation

C1 Are faculty resources adequate? If you are not requesting or have not been authorized to hire additional faculty, demonstrate how course will fit into the schedules of current faculty. What will be taught less frequently or in fewer sections to make this possible?

Current faculty resources are adequate. The students who enroll in MA 105 would have enrolled in MA 110 if this new course were not available. Consequently, we will decrease the number of sections of MA 110 in correspondence with the number of sections of MA 105 that are offered. This worked well with the experimental course MA 281 in the 1996/97 academic year. We had previously offered 15 sections of MA 110, but in the fall of 1996 we offered 10 sections of MA 110 and 5 sections of MA 281.

C2 What other resources will be needed to teach this course and how adequate are the current resources? If not adequate, what plans exist for achieving adequacy? Reply in terms of the following: Space; Equipment; Laboratory supplies and other consumable goods; travel funds.

No other resources will be needed to teach this course.

C3 Are any of the resources for this course funded by a grant? If so, what provisions have been made to continue support for this course once the grant has expired? (Attach letters of support from Dean, Provost, etc.)

None of the resources for this course will be funded by a grant.

C4 How frequently do you expect this course to be offered? Is this course particularly designed for or restricted to certain seasonal semesters?

This course will be offered every semester and each summer session.

C5 How many sections of this course do you anticipate offering in any single semester?

Five sections of this course were offered as MA 281 during the fall semester 1996, for students in the College of Business. The number of sections of MA 110 was decreased by a corresponding number of offerings. For spring 1997, eight sections of MA 110 were offered and five sections of MA 281. Once the course receives approval, the number of offerings of MA 105 will be increased to approximately eight to accommodate students from Colleges other than Business who will find MA 105 a more appropriate preparation for MA 121 than MA 110.

C6 How many students do you plan to accommodate in a section of this course? Is this planned number limited by the availability of any resources? Explain.

Sections of MA 105 will accommodate between 30 and 35 students. This is based on the seating capacity of rooms in Stright Hall where all mathematics courses are taught.

C7 Does any professional society recommend enrollment limits or parameters for a course of this nature? If they do, please quote from appropriate documents.

The generally accepted maximum enrollment for courses of this type is approximately 30 students. A reference that gives this number is CROSSROADS IN MATHEMATICS - Standards for Introductory College Mathematics Before Calculus, published by the American Mathematical Association of Two-Year Colleges in 1995 (pg. 52).

Section D: Miscellaneous

No additional information.

Department of Mathematics
Indiana University of Pennsylvania
233 Stright Hall
Indiana, Pennsylvania 15705-1072

(412) 357-2608



To: Department Chairpersons

From: Gerald Buriok, Chairman
Mathematics Department *gmb*

Date: July 10, 1996

Subject: Support for Curriculum Change

This memo is being sent to inform you of our intention and to request your support for adding an alternative to MA 110 Elementary Functions as a prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences.

The Mathematics Department is preparing a new course, MA 105 College Algebra, for submission to the University-wide Undergraduate Curriculum Committee (UWUCC). We are also proposing a change in the prerequisite for MA 121 from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation." As you know, the UWUCC requires statements of support from departments affected by curricular changes and I am asking you to sign and return the enclosed form to indicate your support for this change in the prerequisite for MA 121.

The rationale for changing the prerequisite for MA 121 is as follows. The Mathematics Department currently offers three calculus sequences. MA 121/122 Calculus for Business, Natural, and Social Sciences, MA 123/124 Calculus for Physics and Chemistry, and MA 127/128/227 Calculus (for math majors). Although these calculus sequences are quite different in their level of expectations, all three now have the same prerequisite, namely MA 110 Elementary Functions. MA 105 is being introduced as an alternative to MA 110 for students who are required to complete MA 121 rather than the more demanding courses MA 123 and MA 127. With the addition of this new course, we will be able to concentrate on the specific topics that will better prepare students for the calculus course they are required to take.

I have attached a copy of the syllabus for the proposed MA 105 course. Please contact me if you have any questions. Otherwise, I would appreciate your returning the enclosed form by August 1, 1996.

To: Gerald Buriok, Department Chairpman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name _____, Department Chairperson

Department _____

Date _____

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairpman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name Donald A. Walker, Department Chairperson

Department Economics

Date 8/7/96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairpman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name , Department Chairperson

Department Biology

Date 8/2/96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairpman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name J. W. Fall, Department Chairperson

Department Geoscience

Date 8-1-96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name James B. Ball, Department Chairperson

Department Health & Physical Educ.

Date 7/29/96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairpman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name Susan Fuller, Department Chairperson

Department Geography + Regional Planning

Date 7-23-96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name Richard D. Roberts, Department Chairperson

Department Physics

Date July 16, 1996

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairpman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name Joanne B. Steiner, Department Chairperson.

Department Food & Nutrition

Date 7/18/96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name Robert L. Whitmer, Department Chairperson

Department French

Date 7/19/96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name DR. W. W. OBLITEY, Department Chairperson

Department COMPUTER SCIENCE

Date 7/16/96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairpman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name Jodell Kuznesol, Department Chairperson

Department Nursing and Allied Health Professions

Date 7-16-96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairpman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name Josem Cananaya, Department Chairperson
Department Spanish & Classical Langs.
Date 7/17/96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name Robert Vaughan, Department Chairperson

Department Chemistry


Date 7/18/96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

To: Gerald Buriok, Department Chairpman
Mathematics Department
233 Stright Hall

Subject: Prerequisite for MA 121

I understand that the Mathematics Department is in the process of seeking approval of a new course, MA 105 College Algebra. I have been informed by the Mathematics Department of their proposal to change the prerequisite for MA 121 Calculus I for Business, Natural, and Social Sciences from "MA 110 or equivalent high school preparation" to "MA 105 or MA 110 or equivalent high school preparation". I have no objection to this change in prerequisite.

Name JONNA STREIFHAU  Department Chairperson

Department HDES

Date 7.18.96

[Please return this form to the Mathematics Department, 233 Stright Hall, by August 1.]

Date: August 26, 1996

Subject: Proposed Changes in MA121

To: Dr. Jerry Buriok, Chairman

From: Lon Ferguson, Chairman *LF*
Safety Sciences Curriculum Committee

Sorry for the delay in responding to your previous request for feedback on the proposed changes to MA121. Members of the Safety Sciences Curriculum Committee as well as Dr. Soule, Chairman of the Safety Sciences Department, have reviewed the proposed changes and, consequently, support the changes for MA121.

Buriok;Ferguson3