# <u>VISION</u>

Mathematics is an instructional division that provides learning opportunities for students to transform their lives.

# **MISSION**

Our Developmental, Professional-Technical, and Lower Division College Transfer courses help students reach program and degree goals, upgrade skills, and enhance career choices. Our courses help students explore mathematics, develop and enhance their mathematics reasoning skills, and improve and strengthen their quantitative literacy. The mission of the Mathematics Division is to offer courses in compliance with the needs of other college programs and majors; including Mathematics. Almost all students are required to take mathematics at some time during their attendance at Lane Community College.

# **CORE VALUES**

The Mathematics Division supports learning by creating an environment that respects the needs and potential of each student through fairness, honesty, and openness. We cultivate a respectful, inclusive, and accessible learning environment. We are constantly responding to the challenges of a changing technological community and workplace. We attempt to remove barriers to learning for our students.

#### Core Value 1: Learning

 Delivery strategies and modeling: The Mathematics Division utilizes various modes of instruction, a number of different time blocks, open-entry/exit, variable credit, independent study, multiple tracks, and courses designed to meet a myriad of student needs.

#### Core Value 2: Diversity

- The Mathematics Division strives to welcome, value and promote diversity amongst our staff, our students, and our community. Our office staff and instructors work diligently to ensure respectful, inclusive and accessible working and learning environments for our staff and students.
- The Mathematics Division supports and encourages all of our faculty and staff to participate in diversity trainings and in multicultural center events.
- When hiring, the Mathematics Division has adhered to Lane's affirmative action/equal opportunity guidelines. We attempt to recruit faculty of color by advertising in national publications, using Listserv and web advertisements, posting positions at conferences and using word of mouth.
- Postings have listed "working effectively with students from diverse cultural, racial and ethnic backgrounds, as well as students with disabilities or with other special learning disabilities" as one of the core essential functions of a faculty member.
- In an effort to be more effective teachers, the Mathematics Division has devised delivery strategies (various modes of instruction: including open-entry/exit, variable credit, and modularized delivery) that address the following diversities:
  - Students learn at different rates.
  - Students' abilities vary greatly.
  - Students learn in different ways.

# **Core Value 3: Innovation**

- The Mathematics Division offers students a variety of ways to study in order to adjust to their needs and increase their success: variable credit, open-entry/exit, late-start classes, cooperative learning, video tapes (overnight checkout available), traditional lecture, lecture/lab, independent study, and a new and innovative modularized instruction (Flexible Sequence Algebra).
- The Mathematics Division continues to have a culture of pedagogical renewal and innovation. We have in the past initiated and/or participated in such projects as:
  - Early learning communities involving mathematics and other core curricula;
  - Leaders in the movement to utilize graphing calculators and computers in our courses to enhance the learning environment;
  - Math anxiety workshops and classes;
  - Placed developmental math courses in the Academic Learning Skills Division to better serve our students;
  - Researched and developed a modeling approach for our calculus courses;
  - Designed, updated, implemented and maintain a rigorous placement testing system to ensure proper placement and enhancement of student retention;
  - Experimented with computer mediated and on-line (distance learning) courses;
  - Faculty developed and maintain mathematics web-site which includes: information about course web-pages, grants in the department, faculty and staff, course descriptions, course syllabi, texts for courses, calculator recommendations by course, and related sites;
  - Faculty developed and maintain on-line courses and web-pages;
  - Faculty developed and maintain on-line newsletter for all faculty;
  - We received a National Science Foundation grant to develop computer simulations of industrial statistical applications;
  - Designed, implemented and upkeep a computer test generation system for web-based testing that is used in-house by the Math Resource Center and at remote sites (e.g., Florence, Cottage Grove campuses); and
  - This summer, Lane Community College was selected to receive a FIPSE 0 grant under the Comprehensive Program of the United States Department of Education. The award is for \$398,484 federal dollars to fund a year of planning and two years of implementation, research, and dissemination. The comprehensive program of the Fund for the Improvement of Postsecondary Education encourages projects that are inclusive, action-oriented, innovative, bold-thinking, and responsive to practitioners. The program, called Flexible Sequence Algebra, creates and pilots a new curriculum and teaching approach for developmental algebra. FSA seeks to provide the benefits of flexible pacing, modular instruction, and variable credit classes while maintaining the structure and support of instructor-led classes. In each course section, the material is broken into two-week long modules that are taught sequentially. However, if a student fails a particular module, he or she moves into a "trailing" section, repeats the failed module, and then continues additional modules in the appropriate sequence. Because different sections are overlapping and start with different modules, students can be placed more effectively, and gain course credit for individual modules as they complete them.

- The division stays current with educational literature and trends and tracks the current revolution in technology and frequently revises its curriculum accordingly. Technology is incorporated into curriculum as a tool to enhance and improve the learning environment for our students, not as a "crutch" or substitute to developing concepts.
- The division supports and encourages faculty and staff participation in statewide and national conferences to stay current.

# Core Value 4: Collaboration and Partnership

- The Mathematics Division promotes meaningful participation in a shared governance structure: a modified participatory governance structure. Although decision-making methods vary according to the topic, and a particular decision might be the final responsibility of one person or group, the division follows a philosophy of decision making that includes: input to the decision-making process from affected parties, timely discussion of issues, and the revision of decisions when needed.
  - Department charter reflects a tradition of shared decision making. Our charter states: "The Mathematics Division supports the philosophy that individuals who take the responsibility to research decisions and who have the responsibility for carrying out decisions should have, when practical, the opportunity to participate in the making of those decisions".
  - Recognizing the importance and expertise of our part-time faculty, the division invites and encourages these faculty members to participate: in curriculum meetings, on hiring committees, and in in-service activities. An elected part-time instructor represents part-time staff members (with full voting privileges) at division meetings.
  - The Mathematics Division utilizes the Mathematics Advisory Committee (MAC), which is an advisory committee to help the division anticipate potential problems and discuss possible solutions prior to division meetings.
  - $\circ~$  Advisory Committee participation (Engineering).
  - $\circ$  Faculty are actively involved in campus-wide governance committees.
  - Faculty actively participate in Faculty Council.
- The Mathematics Division encourages and expands partnerships with organizations and groups in the community by:
  - Serving the mathematics needs of a wide range of students, from students whose math anxiety blocks them from learning basic arithmetic, through students in vocational programs who need highly specific math skills, including students transferring to four year science and engineering programs;
  - Working through LCC's College Now program, with local high schools, to offer college-level mathematics courses for college credit in high schools through out the county;
  - Working with local high schools to promote math awareness by hosting the annual Math Skills Fair; and
  - $\circ$   $\;$  Faculty members actively involved in Advisory Committees.

# <u>Core Value 5: Integrity</u>

- The Mathematics Division fosters an environment of respect, fairness, honesty, and openness:
  - Student Code of Conduct;
  - Fostering respect and openness when dealing with a wide variety of students, providing placement (enforced), multiple modes of instruction and course offerings and times to meet our diverse student needs and the expectation that students will reciprocate with 100% effort;
  - Encourage student access to Instructors and Division Chair by posting office hours and setting up appointments;
  - Respect the values of the group without disrespecting the individual;
  - Students and Instructors are held to standards of integrity, honesty, and mutual respect;
  - Maintenance of grading standards; and
  - Cultivation of a collegial working environment, where each of us will encourage healthy debate and advocacy.
- The Mathematics Division ensures the quality, consistency and integrity of our courses:
  - Through regular assessment of our courses and sequences;
  - Through coordination with faculty in the specific programs both within LCC and in transferring institutions;
  - Through standards for hiring mathematics faculty;
  - Via semi-annual meetings with the high school College Now mathematics instructors;
  - With our Scope and Sequence document that guides our curriculum (It is reviewed and updated periodically to meet national standards.);
  - Through the use of common assessments for many of our courses;
  - Through regular interaction between course leads and full and part-time instructors; and
  - $\circ$   $\;$  Through regular evaluation of all faculty and staff.

# Core Value 6: Accessibility

- The Mathematics Division **strategically grows learning opportunities** by
  - Developing/revising/revamping curriculum and incorporating technology to meet national standards and program needs;
  - Program Availability:
    - Scheduling classes for the convenience of students (offering a variety of times and days, evenings and Saturdays);
    - Providing different modes of instruction (open-entry, variable credit, modularized instruction, different tracks);
    - Outreach center availability; and
    - Appropriate placement.
  - Instructor and Staff Availability:
    - Providing significant opportunities for interaction with students inside and outside the classroom;
    - Providing office hours and TBA opportunities;
    - Extensive free tutoring support via the Math Resource Center; and
    - Providing, equipping, and staffing a Mathematics Computer Lab.

### **STRATEGIC DIRECTIONS**

# Strategic Direction 1: Achieve Financial Stability

- Mathematics courses are required for all programs and majors and that translates to:
  - $\circ$   $\,$  Constant high demand for classes and high FTE;
  - Continued stability in terms of new student populations;
  - Availability of student base all year permits us to budget appropriately;
  - Ability to generate revenue through full classes and tuition-based offerings;
  - $\circ$   $\,$  Running classes at or over capacity to serve students; and
  - Operating within our budget.
- The Mathematics Division offers approximately 1/3 of its courses tuition-based (all summer term courses are tuition-based), which frees up general fund dollars for other programs and divisions.
- The Mathematics Division continues greater use of part time instructors, which helps our budget bottom line but places more demand on staff (i.e., budget monitoring, payroll contracts and Banner approvals, tuition-based spreadsheets, etc.) and on faculty with respect to committee work, curriculum development, coordination, leadership responsibilities and mentoring.

To be emphasized: This increased use of part-time instructors is NOT an ideal situation for the division, even though it contributes to the financial stability of the college.

- Mathematics staff are diligent in observing cost-saving measures:
  - Reuse/recycle supplies/materials
    - Reuse supplies;
    - Reuse/recycle office furniture and equipment;
    - Recycling of paper products for tutoring scratch paper;
    - Reuse and recycle materials (transparencies, overheads);
    - Avoid waste by reusing course materials whenever possible;
  - Conserve supplies;
    - Limiting copying and printing;
    - Try to limit handouts to only those necessary without sacrificing quality;
    - Conserve materials;
    - Be conscious of spending;
    - Wise use of supplies;
    - Cost effective use of supplies;
    - Often buying simple office supplies for own use from own pocket;
    - Entering syllabi/practice tests/ worksheets on-line;
    - Utilize data systems organized without paper (i.e., Banner, Groupwise email);
  - Making do with less;
    - Computers used beyond their normal life expectancy;
    - Computer hand-me-downs to part-time staff.
- Staff do most of own typing with limited classified support staff available.

# Strategic Direction 2: Enhance College Climate

- Mathematics faculty and staff work closely with students, each other, and colleagues in their discipline to create focused and enriched learning environments.
  - In the classroom:
    - Provide and enforce appropriate placement;
    - Advise and facilitate students in registering for the appropriate course;
    - With Disability Services to accommodate students with disabilities;
    - Facilitate student-to-student learning groups;
    - Provide positive feedback and open communication with students in the classroom, during office hours, and in the Math Resource Center (MRC); and
    - Bring enthusiasm, excitement and purpose to the classroom.
  - Outside of classroom:
    - One-to-one contact with students in the (MRC);
    - Extended office hours to provide greater accessibility for students;
    - Go beyond the basics to help students succeed with multiple modes of instruction and approach; and
    - Put in lots of extra hours with students.
    - Our student retention relies on an emphasis of accommodating individual needs.
    - We believe all students are unique; we strive to embrace their individual needs and gifts.
    - We encourage our students to utilize instructor office hours and the (MRC) to discuss any difficulties they are having with content.
    - Many additional faculty hours spent with struggling students; and
    - Close daily contact with individual students.
  - Feedback opportunities:
    - Listening to individual student concerns; and
    - Give students opportunities to give us feedback.
  - Addressing special needs by:
    - Encouraging students to utilize available resources (e.g., MRC, Academic Learning Skills, ADA, etc.);
    - Providing advising/counseling assistance for all math students;
    - Providing a sense of inclusiveness among all students;
    - Suggesting different modes of instruction to assist students with disabilities;
    - Assisting students with different learning needs by referring to the appropriate person or area; and
    - Providing math and testing anxiety assistance and workshops.
- Mathematics staff work with each other in the department to create a caring and supportive environment through:
  - Communicating:
    - Open communication with students and staff; and
    - First and third Thursday staff meetings to discuss issues.
  - Treating each other with respect:
    - We treat each other and our students with respect.

- Interpersonal relationships:
  - Social events for staff (i.e., parties, holiday, retirement, birthday, showers); potlucks with staff, joint potlucks with other departments;
  - Help each other out in difficult personal situations;
  - Lend a hand and being supportive whenever we can, not just for what is required.
  - Collect money, needed items and gifts for Womenspace at Christmas and other times of the year, and for retired mathematics professors in the Ukraine;
  - WE CARE ABOUT EACH OTHER!
- Mathematics staff help coordinate with faculty in the specific programs both within LCC and in transferring institutions. Continuing contact with lead faculty in these programs allows goals to be refined or changed based upon students' performance in the program, all with the goal of improving student retention.
- Mathematics staff help support the rest of the College in its work and initiatives.
  - Learning and recognition opportunities for staff:
    - Faculty Connections Program;
    - Participation in mentor program at Faculty Connections;
    - Support continuing education for staff;
    - Peer projects which develop support systems and relationships;
    - Classified Employee of Month Award; and
    - Innovation awards.
  - Support college wide work and initiatives:
    - Participation on College-wide committees; and
    - Implementing Banner.
- The Mathematics Division supports the broader community.
  - Offering College Now courses for college credit through our local high schools throughout the county;
  - Hosting the Math Skills Fair for local high schools to promote mathematics achievement;
  - Supporting Aviation Maintenance, Culinary, Dental, Elementary Education, Nursing and other Professional/Technical Programs by coordinating, developing (revising, updating), planning (scheduling, being part of a learning community) and instructing courses for these programs that help students reach their goals.
  - Supporting the Pre-Engineering Program by:
    - Assisting in providing county and state with much needed engineers;
    - Offering Pre-engineering courses, which are taught by mathematics faculty.

# **Strategic Direction 3: Build Organizational Structure**

- The Mathematics Division schedules regular staff meetings.
  - The first and third Thursdays and as needed for regular division meetings; with printed agenda; minutes are taken; membership includes all contracted faculty and representation of part-time and classified staff.
- Staff rotate responsibility quarterly for chairing the division meeting.
- Mathematics Division ensures staff participation in decision making.
  - The Mathematics Division **promotes meaningful participation in a shared governance structure**: a modified participatory governance structure. Although decision-making methods vary according to the topic, and a particular decision might be the final responsibility of one person or group, the division follows a philosophy of decision making that includes: input to the decision-making process from affected parties, timely discussion of issues, and the revision of decisions when needed.
    - All stakeholders have opportunity for input and decision making; and
    - Are part of a participatory governance structure.
- The Mathematics Division utilizes the Mathematics Advisory Committee (MAC), an advisory committee to help the division anticipate potential problems and discuss possible solutions prior to division meetings, which are then presented to the division members at regular division meetings.
- The Mathematics Division ensures continuity and standards in curriculum.
  - Lead instructor for all major curriculum areas;
  - Lead instructors assist in mentoring new employees;
  - Scope and sequence project completed to provide continuity and consistency among course offerings and to serve as a guide for instructors in order to align class lessons with course objectives and to assure that prerequisite courses were covering background content;
  - Use of advisory committees (by faculty teaching pre-engineering courses);
  - Develop long term goals, review/implement research on mathematics reform when appropriate; and
  - Implement technology where appropriate.
- The Mathematics Division ensures communication through methods other than meetings.
  - Information is provided to staff in writing;
  - Email is used to provide current information to all staff;
  - Email supports open discussion in division;
  - Memos and emails provide an informal way to communicate;
  - Have and maintain our own math website; and
  - Online policies and procedures are available via website.

# Strategic Direction 4: Implement BWEL

- The Mathematics Division could make greater use of the Center for Meeting and Learning.
  - Use center for Math Skills Fair in spring;
  - Currently use center for College Now articulation meetings; and
  - Pre-engineering outreach and advisory meetings.
- Maintain/strengthen connections to community.
  - Employee training (i.e., Sony and Star Tech pre-employee training in basic math and statistics using Excel through Business & Industry Services/Training & Development @ LCC);
  - Offered courses in trigonometry for Spectra Physics employees;
  - Expanded College Now offerings to local high schools;
  - Consulting with other facilities; and
  - Secured a National Science Foundation grant to make computer simulations for industrial applications of statistics for use in technician training (Key Knife Corp., manufacturer of chipper blades and other wood manufacturing equipment, was the model used in the grant application).

#### Mathematics Unit Planning Chapter 1: Mathematics Unit Description

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# **Chapter 1: Mathematics Sub-Unit Descriptions**

The Mathematics Division enables students to learn the mathematical knowledge and skills they need by offering a variety of courses and formats.

The Mathematics Division utilizes various modes of instruction, a number of different time blocks, open-entry/exit, variable credit, independent study, multiple tracks, and courses designed to meet a myriad of student needs. These courses are divided into three subunits: Developmental, Professional/Technical, and Lower Division Transfer.

Pre-transfer level mathematics courses (developmental and professional/technical) provide basic work and life skills. All courses in these two sub-units satisfy college program requirements or prerequisites for requirements. They prepare students for subsequent mathematics and mathematics-related courses that are necessary components of many education and career paths.

# **Developmental (DEV)**

Developmental level mathematics courses prepare students for either work in transfer courses or professional/technical majors. Developmental courses support other college programs or degree requirements. Developmental offerings provide options for students to start at their skill level (via placement testing or prerequisite course work) and work up to the level required for transfer or program requirements.

# Professional/Technical (PT)

Theses courses provide support for professional technical programs. These courses teach students the mathematics they need to succeed in their careers in business, computer information systems, health occupations, mechanics, and technical fields.

# Lower Division Transfer (LDT)

These courses teach the first two years of college mathematics needed by students of architecture, business, computer science, engineering, science, teaching, and other bachelor's degree programs.

All three sub-units offer math literacy courses. These courses help people become skilled and comfortable with everyday mathematics.

### CATALOG DESCRIPTIONS

# Mth 020 MATH RENEWAL (DEV) (3 credits)

This course gives a review of averages, order of operations, fractions, decimals, equation solving, and problem solving. The major emphasis will be on using all the review concepts on ratio and proportion, percents, measurement and simple geometry. Some applications for technical careers will be incorporated into the class for students in professional/technical programs. Required equipment: DAL scientific calculator-purchase after instructor recommendation.

# Mth 020 BASIC MATH REVIEW (MRC) (DEV)

#### (3 credits, variable)

Offered as a variable credit (1-3) course using tutorial materials for self-paced study in a resource center setting (MRC).

This is a course in practical mathematics, including the arithmetic operations of whole numbers, fractions, and decimals. Estimation of whole number operations and square roots, calculator usage, ratio, percent, data analysis, graphs, statistics, and measurement are also covered. Whole Number and Fraction Concepts, Arithmetic Operations, and Exponents, 1 credit. Decimals, Ratio and Percent, 1 credit. Averages, Graphs, Measurement, and Roots, 1 credit.

[Permission to enroll is required for independent study. Most students are more successful in lecture Mth 020 than independent study, Mth 020 (MRC).]

# Mth 022 NUMBER REASONING (DEV)

#### (l credit)

Individualized study. Reasoning with whole numbers, fractions, decimals, and percents. Students will be provided practice in comparing, estimating and reflecting on the reasonableness of answers. Students will examine answers to problems and learn to evaluate whether an answer is of reasonable size. It is expected that students enter this course knowing how to compute by hand and calculator with numbers, although reminders of those skills will be included.

#### Mth 025 BASIC MATH APPLICATIONS (PT)

#### (3 credits)

Basic Mathematics Applications is a 3-credit course emphasizing the application of basic mathematics to everyday life and business situations. Everyday life topics include mathematics for personal finance, mathematics applied to personal health, mathematics applied to household and yard, and mathematics found in newspapers and magazines. Business topics include applications involving payroll, simple and compound interest, discounts, markup and markdown, annuities, investments, and sales tax. Additional topics may be chosen from mathematics applied to travel, recreation and sports, world resources and social issues. Basic skills in fractions, decimals, percents and ratios will be assumed. The course will develop skills in measurement, metric system, signed numbers, using graphs and tables, and introductory probability and statistics. The course will focus on group work, skill maintenance, investigations, and projects.

# Mth 026 DOSAGE MATH FOR MOAs (PT)

# (2 credits)

This is a course in medical dosage calculations for medical office assistants. A brief review of decimals and percents related to medical dosages is included. Students are given hands-on experience with the metric, household, and apothecary measurement systems as related to medical dosages. Students learn equivalences across the measurement systems. The course covers unit conversions, preparations of solutions, oral medication dosages, and pediatric dosages. This course does not include dosage conversions necessary to deliver drugs intravenously. Students will do calculations by hand and with a calculator. This course does not include dosage conversions necessary to deliver drugs who are planning to be nurses or emergency medical technicians should take Dosage Computation Math for Nurses (Mth 054).

# Mth 052 MATH FOR INTRODUCTORY PHYSICAL SCIENCE (PT)

# (4 credits)

This course covers the basic mathematics and algebra used in an introductory chemistry or other science course. Topics include dimensional analysis, approximate numbers, exponential and scientific notation, signed numbers, scales, graphs, metric measurement, percent applications, proportions, linear equations and formulas, the algebra of units, introduction to logarithms, and basic geometric measurement. Scientific calculator and metric ruler required.

# Mth 053 METRIC MEASUREMENT (DEV)

# (1 credit)

An independent study course offered under the supervision of an instructor. The course provides hands-on experience in metric measurement and encourages metric common sense: the ability to estimate and think in metric units, metric prefixes, metric symbols, conversion of units, temperature, length, mass, and volume.

# Mth 054 DOSAGE COMPUTATION FOR NURSES (PT)

# (1 credit)

During the course, students will be required to demonstrate retention of reasoning, estimation, and calculating skills using basic mathematics, dimensional analysis, and metric measurements. The course covers calculation of medical dosages for members of the health professions including unit conversions, preparations of solutions, oral medication dosages, and pediatric dosages. Students in the nursing program will study flow rates for intravenous infusions. Nursing students must reach a level of proficiency set by the Nursing Department. Students will do calculations with and without a calculator.

# Mth 058 WORD PROBLEMS IN ALGEBRA (DEV)

# (1 credit)

An independent study course offered under the supervision of an instructor. This course requires some beginning algebra skills. It covers methods for solving standard word problems using basic algebra skills.

# Mth 060 BEGINNING ALGEBRA (DEV)

# (4 credits)

This course is for the student who has not taken algebra recently, or who desires a slowpaced introduction to the subject. This is the first term of a two-term sequence in introductory algebra. Topics include a selective review of arithmetic, tables and graphs, signed numbers, equation solving, linear equations, and ratio and proportion. Mth 060 prepares students for Elementary Algebra (Mth 065).

Mth 060 and Mth 065 provide a two-term sequence preparatory to Essentials of Algebra (Mth 090) or Intermediate Algebra (Mth 095). Scientific calculator required.

# Mth 060 BEGINNING ALGEBRA (MRC) (DEV)

#### (4 credits, variable)

Offered as a variable credit (1-4) course using tutorial materials for self-paced study in a resource center setting (MRC). Permission to enroll is required for independent study. Also, offered as a 4-credit lecture course. [Most students are more successful in lecture Mth 060 than independent study, Mth 060 (MRC).] Scientific calculator is required.

# Mth 065 ELEMENTARY ALGEBRA (DEV)

# (4 credits)

This is the second term of a two-term sequence in introductory algebra. Topics include systems of linear equations, quadratic equations, polynomials, rational expressions, exponents and radicals. When taken after Beginning Algebra (Mth 060), prepares student for Essentials of Algebra (Mth 090) or Intermediate Algebra (Mth 095). A scientific calculator is required.

# Mth 065 ELEMENTARY ALGEBRA (MRC) (DEV)

#### (4 credits, variable)

Offered as a variable credit (1-4) course using tutorial materials for independent study in a resource center setting (MRC). Permission to enroll is required for independent study. Also, offered as a 4-credit lecture course. [Most students are more successful in lecture Mth 065 than independent study, Mth 065 (MRC).]

Second term of a traditional sequence in algebra. Course covers factoring, polynomials, rational expressions, radicals, quadratic equations, and linear systems. When taken after Beginning Algebra (Mth 060), prepares student for Essentials of Algebra (Mth 090) or Intermediate Algebra (Mth 095). Scientific Calculator required.

# Mth 070 INTRODUCTORY ALGEBRA (DEV)

# (5 credits)

Mth 070 is a fast paced review of algebra for students with recent algebra experience. (For others, Mth 060 and 065 provide a more relaxed and thorough introduction to the subject. If you are unsure whether to take Mth 070 or Mth 060, seek the advice of a Counselor or Advisor). Mth 070 is the beginning term of a two-term sequence (Mth 070, 095) leading to Geometry (Mth 097), Introduction to Contemporary Mathematics (Mth 105), College Algebra (Mth 111), or Fundamentals of Elementary Mathematics 1 (Mth 211). Topics include problem solving, signed numbers, exponents, equations, polynomials, graphing, systems of equations, radicals, and quadratic equations. A scientific calculator required.

# Mth 071 INFORMAL GEOMETRY 1 (DEV)

# (2 credits)

An independent study course offered under the supervision of an instructor. This informal course in geometry requires elementary algebra skills. Topics include angles, parallel and perpendicular lines, polygons, polyhedra, transformations, triangles, congruence, quadrilaterals, and the coordinate plane. Basic vocabulary and elementary relationships are stressed. Suitable for students with little background in geometry and who want new concepts introduced one at a time. MTH 071 and MTH 072 together are one way to fulfill the geometric prerequisite for Fundamentals of Elementary mathematics: MTH 211, 212, 213. They do not satisfy the geometry prerequisites for Trigonometry MTH 112 or MTH 251 Calculus 1.

# Mth 072 INFORMAL GEOMETRY 2 (DEV)

# (2 credits)

An independent study course under the supervision of an instructor. This course includes concepts and computation of perimeter, area, surface area, and volume; applications of similar figures; the Pythagorean Theorem, and elementary trigonometric ratios; attributes and measurement of circles, prisms, pyramids, cones, and cylinders. Transformations related to coordinate geometry. MTH 071 and MTH 072 together are one way to fulfill the geometric prerequisite for Fundamentals of Elementary Mathematics MTH 211, 212, 213. They do not satisfy the geometry prerequisites for Trigonometry MTH 112 or MTH 251 Calculus 1.

# Mth 076 APPLIED GEOMETRY FOR TECHNICIANS (PT)

# (4 credits)

A first course in geometry with an introduction to right triangle trigonometry. Algebraic skills necessary for geometry and other topics will be introduced as needed. The course will also include estimation; percent; measurement in the US customary and Metric systems; unit analysis with linear, square and cubic units; ratio and proportion; and an introduction to spreadsheets. The geometry covered will include mathematics vocabulary, principles and applications of the following: angle measure; parallel lines; polygons, similarity and congruence; perimeter and circumference; area and volume of basic figures such as prisms and cylinders; and right triangle trigonometry.

# Mth 086 APPLIED ALGEBRA FOR TECHNICIANS (PT)

# (4 credits)

The primary focus in this course will be algebraic skills needed to continue on in the study of applied mathematics. These will include but are not limited to signed numbers, continued work with formulas, integer exponents, scientific notation, the Cartesian coordinate system, linear equations and their graphs, algebraic expressions, and quadratic equations and their graphs. More work will be done with proportions and variation, unit analysis, the Metric system of measurement, and tolerances. Fraction skills will be reviewed as needed. Geometry will be integrated throughout the course and skills learned in Mth 076 Applied Geometry for Technicians will be reviewed periodically (as needed).

# Mth 090 ESSENTIALS OF ALGEBRA (MRC) (DEV)

# (4 credits, variable)

Offered as a variable credit (1-4) course using tutorial materials for independent study in a resource center setting (MRC). Permission to enroll is required for independent study.

Third term of a one-year sequence in algebra; function concept, polynomials, rational equations, exponents, quadratic functions, introduction to conic sections, exponential and logarithmic functions, inequalities. Does not satisfy prerequisite material for College Algebra Mth 111, but does satisfy Associates of General Studies, and Associates of Applied Science degree requirements for a limited number of Lane programs. Scientific Calculator is required.

# Mth 095 INTERMEDIATE ALGEBRA (DEV)

# (5 credits)

This course leads to Geometry (Mth 097), Introduction to Contemporary Mathematics (Mth 105), College Algebra (Mth 111), or Fundamentals of Elementary Mathematics 1 (Mth 211). Topics include equations, function notation, polynomials, coordinate graphing, rational equations, radical equations, exponents, quadratic functions, exponential and logarithmic functions, inequalities and problem solving methods. Scientific calculator required. A graphing calculator (TI-83) is suggested for students taking math courses above Mth 095.

# Mth 096 USING THE SCIENTIFIC GRAPHING CALCULATOR (DEV)

# (1 credit)

This course is designed to introduce students to effective use of the graphing calculator. The one credit course emphasizes use of scientific function keys, memory cells, techniques to evaluate expressions, how to graph functions, and how to graphically solve equations. It includes programming capabilities of the calculator. Emphasis is on establishing effective viewing windows, solving equations, evaluating and graphing functions in parametric mode, and writing/using programs to more effectively tap the power of the calculator. A scientific graphing calculator is required. The instructor may specify a specific calculator.

# Mth 097 GEOMETRY (DEV)

# (4 credits)

A course in informal geometry covering the study of lines, planes, polygons, circles, solids, area, perimeter, volume, surface area, Pythagorean Theorem, congruence, and similar figures. Applications and exploration of geometry topics rather than proofs will be stressed. This course is the geometry prerequisite for Mth 111, 112, and 251. It is one way to satisfy the geometry prerequisite for Mth 211. Scientific calculator required.

# Mth 105 INTRO TO CONTEMPORARY MATHEMATICS (LDT)

#### (4 credits)

Survey of Applications of Mathematics for non-science major including statistics, measurement, and mathematical modeling. Also available through Distance Learning (Winter term).

# Mth 111 COLLEGE ALGEBRA (LDT)

# (5 credits)

College algebra is the study of basic functions and their applications. This includes polynomial, rational, exponential, and logarithmic functions and their inverses. Other topics include an introduction to sequences and series, the binomial theorem, and nonlinear systems of equations. In accordance with national recommendations, this course emphasizes skill building, problem solving, modeling, reasoning, communication, connections with other disciplines, and the appropriate use of technology. A scientific programmable calculator capable of displaying graphs of functions is required. However, students will be held accountable for many skills without a calculator. (See current calculator recommendation chart.)

# Mth 112 TRIGONOMETRY (LDT)

# (4 credits)

Trigonometry has wide applications in the world around us. It is a vital tool in construction, physics, and engineering. Trigonometry is preparatory for Calculus I (Differential Calculus, Math 251). The major topics covered include radian measure, circular functions and their graphs, right triangle ratios and related trigonometric functions, identities, solving trigonometric equations, law of sines, law of cosines, and applications. Other topics include polar coordinates, parametric equations, vectors, and conic sections. A graphing calculator is required.

# Mth 211 FUNDAMENTALS OF ELEMENTARY MATHEMATICS 1 (LDT) (4 credits)

First course of a three-term sequence, required or recommended for prospective elementary teachers entering most colleges. Topics include problem solving strategies, functions and patterns, set theory, numeration systems, whole numbers, integers and number theory. The order of the topics may vary with instructor and text.

# Mth 212 FUNDAMENTALS OF ELEMENTARY MATHEMATICS 2 (LDT)

# (4 credits)

Second course of a three-term sequence, required or recommended for prospective elementary teachers entering most colleges. Topics include problem solving strategies, fractions, rational numbers, real numbers, ratio, proportion, percent, scientific notation, descriptive statistics, and topics from probability. The order of topics may vary with instructor and text.

# Mth 213 FUNDAMENTALS OF ELEMENTARY MATHEMATICS 3 (LDT)

# (4 credits)

Third course of a three-term sequence required or recommended for prospective elementary teachers entering most colleges. Topics include problem solving strategies, systems of measure, two- and three- dimensional geometry, symmetry, congruence, similarity, geometric constructions, tessellations, topics from coordinate and transformational geometry. The order of topics may vary with instructor and text.

# Mth 231 DISCRETE MATHEMATICS 1 (LDT)

# (4 credits)

First course in three-term sequence fulfilling the Discrete Mathematics requirement for enrolling in upper division computer Science courses at the University of Oregon and Oregon State University. Topics include formal logic, methods of proof, sequences, mathematical induction, recursion, set theory, combinatorics, elementary counting techniques, relations, functions, analysis of algorithms, Boolean algebra, finite state machines, graphs and trees. The order of the topics may vary with instructor and text.

# Mth 232 DISCRETE MATHEMATICS 2 (LDT)

# (4 credits)

Second course in three-term sequence fulfilling the Discrete Mathematics requirement for enrolling in upper division computer Science courses at the University of Oregon and Oregon State University. Topics include formal logic, methods of proof, sequences, mathematical induction, recursion, set theory, combinatorics, elementary counting techniques, relations, functions, analysis of algorithms, Boolean algebra, finite state machines, graphs and trees. The order of the topics may vary with instructor and text.

# Mth 233 DISCRETE MATHEMATICS 3 (LDT)

# (4 credits)

Third course in three-term sequence fulfilling the Discrete Mathematics requirement for enrolling in upper division computer Science courses at the University of Oregon and Oregon State University. Topics include formal logic, methods of proof, sequences, mathematical induction, recursion, set theory, combinatorics, elementary counting techniques, relations, functions, analysis of algorithms, Boolean algebra, finite state machines, graphs and trees. The order of the topics may vary with instructor and text.

# Mth 241 ELEMENTARY CALCULUS 1 (LDT)

# (4 credits)

Differential calculus (without trigonometry) for business and social sciences. Some review of algebraic techniques with major emphasis on limits, continuity, derivatives, and their applications. Exponential and logarithmic functions, their derivatives and applications, and introductory mathematics of finance.

# Mth 242 ELEMENTARY CALCULUS 2 (LDT)

# (4 credits)

Integral calculus (without trigonometry) for the business and social sciences. Integration and applications for single variable functions, techniques of integration, partial differentiation methods for multivariate functions, and their relative extrema, and matrix algebra.

# Mth 243 INTRO TO PROBABILITY AND STATISTICS (LDT)

# (4 credits)

Basic theory and applications of statistics and probability; distributions of data, probability distributions, measures of central tendency and variability; basic concepts of statistical inference, including confidence intervals, hypothesis testing, correlation and regression, chi-square, and analysis of variance. This course is in the cluster 241, 242, and 243. This cluster satisfies one of the "clusters" of math requirements for the University of Oregon School of Business.

# Mth 251 CALCULUS 1 (Differential Calculus) (LDT) (5 credits)

A first-term calculus course including a brief review of algebra and trigonometry followed by development of the derivative from the perspective of rate of change, slope of the tangent line, and numerical and graphical limits of the difference quotient. The difference quotient is used as a basis for formulating analytical methods, which include the product, quotient, and power rules; implicit differentiation; and procedures for differentiating polynomial, exponential, logarithmic, and trigonometric functions. The course has a focus on practical applications where a mixing of analytical, graphical, and numeric methods supports one another. A key component of the course is to help develop student's abilities to read, understand and discuss differential calculus concepts. A lecture/laboratory component provides opportunities for students to work in groups, verbalize concepts with one another, pursue guided project activities, and explore applications of concepts through technology. Use of a programmable graphing calculator is required.

# Mth 252 CALCULUS 2 (Integral Calculus) (LDT) (5 credits)

A second-term calculus course, covering anti-derivatives and definite integrals with emphasis on concept application to the "real world." Concepts are developed giving equal time to graphical, numerical, and analytical approaches. A key component of the course is to help develop students' abilities to read, understand, and discuss applied integral calculus concepts. Graphing programmable calculator and computer technology is utilized to lessen traditional drudgery and enhance the learning experience. A lecture/lab component of the course allows students time to verbalize concepts with one another, pursue guided project activities, and explore applications of concepts through technology.

# Mth 253 CALCULUS 3 (Infinite Series & Sequences) (LDT) (4 credits)

This is the third-term of a six-term sequence. Indeterminate forms and improper integrals. Sequences and series. Investigation of the convergence of series. Taylor series and power series. Miscellaneous topics include parametric and polar equations and conics. Use of programmable graphic calculator is required.

# Mth 254 VECTOR CALCULUS 1 (Intro to Vectors and Multi-dimensions) (LDT) (4 credits)

This is the fourth-term of a six-term sequence. Major emphasis is on three -dimensional vectors and differential calculus of several variables. Use of a programmable graphing calculator is required.

# Mth 255 VECTOR CALCULUS 2 (Intro to Vector Analysis) (LDT)

# (4 credits)

This is the fifth-term of a six-term sequence. Major emphasis is on multiple integration, vector fields, and applications. Use of programmable graphing calculator required.

# Mth 256 APPLIED DIFFERENTIAL EQUATIONS (LDT)

# (4 credits)

This is the last of a six-term sequence. The course covers methods of solving ordinary differential equations and includes three types of solutions-elementary methods, convergent power series and numeral methods, with applications to physical engineering science.

# Mth 261 INTRO TO LINEAR ALGEBRA (LDT)

# (4 credits)

Systems of Linear Equations, vectors in a geometric setting, real vector spaces, matrices, operations on matrices, inverse of a matrix, determinants, linear transformations, dot product and cross product, eigenvalues and Eigenvectors.

# Mth 261A INTRO TO LINEAR ALGEBRA (narrower focus) (LDT) (2 credits)

See course description above for Mth 261.

#### MATHEMATICS COURSE OUTCOMES

Upon successful completion of this course, the student will be able to:

#### MTH 20 Math Renewal (3 credits):

- 1. Apply reasoning and problem solving skills to basic mathematics problems.
- 2. Use estimation in basic math problems.
- 3. Check the reasonableness of answers.
- 4. Do fraction computations and applications with accuracy.
- 5. Do decimal computations and applications with accuracy.
- 6. Write and simplify ratios and rates.
- 7. Recognize when and where ratios or proportions apply.
- 8. Set up and solve proportions.
- 9. Convert between fractions, decimals, and percents.
- 10. Solve the three basic types of percent problems.
- 11. Solve percent application problems.
- 12. Solve applications using area and perimeter of simple geometric shapes.
- 13. Solve basic equations of the type a + x = b and ax = b that have fractions and decimals.
- 14. Use a scientific calculator to explore and solve basic math problems.
- 15. Apply study skills for learning mathematics, and for coping with math anxiety.
- 16. Correctly use the symbols and vocabulary of basic mathematics.
- 17. Use American and metric measurement.

#### MTH 20 Basic Math Review (MRC) (3 credits, variable):

- 1. Module One (1 credit)
  - A. Whole Numbers
    - I. Read, write, round, and interpret whole numbers.
    - II. Identify and apply meanings for the basic operations.
    - III. Identify and use properties of the basic operations.
    - IV. Compute using order of operations.
    - V. Use the language of the basic operations.
    - VI. Estimate sums, products, differences, and quotients.
    - VII. Complete a Cumulative Review.
  - B. Fractions
    - I. Interpret and compare common fractions.
    - II. Apply meaning of operations to fractions and word problems.
    - III. Compute with fractions and mixed numbers.
    - IV. Complete a Cumulative Review.
- 2. Module Two (1 credit)
  - A. Decimals
    - I. Interpret, read, and write decimal numbers.
    - II. Apply meanings of operations to decimals and word problems.
    - III. Compute with decimals.
    - IV. Convert fractions to decimals and vice versa.
    - V. Interpret square root.

- VI. Estimate answers to fractional and decimal problems.
- VII. Complete a Cumulative Review.
- B. Ratios, Proportion, and Percent
  - I. Write ratios and proportions and find the missing term of a proportion.
  - II. Understand the meaning of percent and write equivalent fractional and decimal forms.
  - III. Solve percent problems using proportions and/or  $R \times B = P$ .
  - IV. Complete a Cumulative Review.
- 3. Module Three (1 credit)
  - A. Graphs and Measurement
    - I. Compute averages, means, and modes.
    - II. Interpret tables, charts and pictographs.
    - III. Interpret bar, line, and circle graphs.
    - IV. Convert from one unit to another in both English and metric systems.
    - V. Understand and use basic formulas for area, and perimeter.
    - VI. Solve measurement problems.
    - VII. Complete a Cumulative Review.

#### MTH 22 Number Reasoning (1 credit):

- 1. Demonstrate 80%-90% computation skill level, (depending on students' program requirements), with the following areas: common/reasonable fractions, decimals, percents and ratios without a calculator.
- 2. Estimate answers for problems involving decimals, fractions, percents and ratios.
- 3. Find errors in methods and answers in problems involving decimals, fractions, percents and ratios.
- 4. Apply reasoning to word problems to find answers.
- 5. Solve application problems.

#### MTH 25 Basic Math Applications (3 credits):

- 1. (Use basic math for applications pertaining to **personal finance**): Calculate sales tax, tips, percent increase and decrease; Do mental addition of fractions. Calculate budgets, mortgages, charge options; Compute simple and compound interest and annuities using formulas; Use computer software to graph budgets.
- 2. (Use basic math for applications pertaining to **personal health**): Analyze food labels, using formulas with health issues; Use the Internet to locate data for health issues; Read line and bar graphs for data.
- 3. (Use basic math for applications pertaining to **business finance**): Compute percents of percents; Compute employee payroll taxes; Calculate percents with markups; Read tables and graph for data; Compute mean and median.
- 4. (Use of basic math for applications pertaining to an **industrial business** such as a culinary arts business): Convert measurements; Compute percent yields on supplies.
- 5. (Use basic math for applications pertaining to **measurements**): Use metrics; Determine the cost of residential electricity; Convert to square units. Compute areas.
- 6. If other topics are included, then the student would be able to: Compute employer payroll taxes; Calculate percents with discounts; Calculate with stocks and bonds; Compute trade invoices and promissory notes; Complete forms for recipe

costing, menu pricing, and inventory; Verify electricity bills; Convert cubic units; Compute areas and volumes; Compute time differences.

# MTH 26 Dosage Math for MOAs (2 credits):

- 1. Identify units as related to length, mass, and volume.
- 2. Demonstrate an understanding of the sizes of units used in medical offices and reports.
- 3. Write correct numerical equivalences within and between metric, apothecary, and household units.
- 4. Write and interpret the accepted abbreviations of units of measure used in medical offices and reports.
- 5. Perform correct calculations with metric, apothecary, and household units used to measure drugs.
- 6. Successfully apply the technique of unit conversion with dimensional analysis for calculating equivalent medical dosages.

# MTH 52 Math for Introductory Physical Science (4 credits):

- 1. Use US Standard and metric units of measure.
- 2. Use and compute with exponential and scientific notations.
- 3. Solve problems using unit or dimensional analysis.
- 4. Use and read measuring tools such as rulers, protractors, and graduated cylinders.
- 5. Apply concepts of approximate numbers.
- 6. Interpret and create simple graphs, especially line graphs.
- 7. Use and compare Fahrenheit, Celsius, and Kelvin temperature scales.
- 8. Interpret and compute with signed numbers.
- 9. Use basic geometric terminology and skills appropriate for physical science.
- 10. Find the volume and density of objects.
- 11. Solve problems involving percents.
- 12. Solve problems involving proportions and conversion factors.
- 13. Solve equations and formulas for one variable.
- 14. Calculate quantities involving logarithms.
- 15. Use a scientific calculator.

# MTH 53 Metric Measurement (1 credit):

- 1. Estimate temperature, length, mass, and volume in metric units.
- 2. Use the metric prefixes, abbreviations, and symbols appropriately.
- 3. Convert a measurement from metric to metric, metric to English, or English to metric.
- 4. Explain differences and advantages of metric system over the English system of measurement.
- 5. Utilize the logical connections among metric units. For example: 1 cm of water has a mass of 1 gram.

#### MTH 54 Dosage Computation Math for Nurses (1 credit):

- 1. Successfully perform calculations with metric, apothecary, & household units used to measure drugs.
- 2. Commit to memory numerical equivalents within and between metric, apothecary, and household units used to measure drugs.

- 3. Commit to memory the accepted abbreviations of units of measure used in the preparation and administration of medications.
- 4. Successfully apply the technique of dimensional analysis for calculating equivalent medical dosages.

# MTH 58 Word Problems in Algebra (1 credit):

- 1. Translate English phrases or statements into algebraic notation.
- 2. Analyze, write equations for, and solve traditional word problems using elementary algebra in these topics:
  - A. Distance, rate, time problems
  - B. Mixture problems
  - C. Lever problems
  - D. Finance problems
  - E. Plane geometry problems
- 3. Analyze, write equations for, and solve word problems using linear equations in two variables.

# MTH 60 Beginning Algebra (4 credits):

- 1. Maintain, use, and expand skills and concepts learned in previous mathematics courses.
  - A. Perform operations with fractions and decimals.
  - B. Have a sense of relative sizes of fractions and decimals.
  - C. Have a sense of percents and use percents in common applications.
  - D. Recognize common geometric shapes; find perimeter and area of rectangles, triangles and circles.
- 2. Perform addition, subtraction, multiplication, and division of rational numbers.
- 3. Use and apply the concepts and language of algebraic expressions.
  - A. Use variables to construct algebraic expressions.
  - B. Evaluate algebraic expressions and simplify expressions using order of operations.
  - C. Simplify algebraic expressions by removing parentheses and combining like terms.
- 4. Solve linear equations and inequalities.
  - A. Solve linear equations algebraically, numerically, and graphically.
  - B. Solve linear inequalities algebraically and graph their solutions on a number line.
- 5. Use algebra to solve application problems.
  - A. Translate a verbal model into an algebraic expression and/or equation and solve the problem.
  - B. Solve problems using ratios and proportions.
  - C. Use unit analysis to solve problems.
  - D. Solve problems involving similarity of shapes.
  - E. Solve direct variation problems.
- 6. Interpret information represented numerically and graphically, and recognize linear relationships represented verbally, numerically, graphically, and algebraically.
  - A. Read and interpret information given in a table or graph.
  - B. Locate points in a rectangular coordinate system and represent equations in two variables graphically.
  - C. Identify the horizontal and vertical intercepts of the graph of an equation and interpret them in terms of an application.

- D. Identify the slope of a line and interpret it in terms of an application.
- E. Use the slope-intercept form of the equation of a line.
- F. Create a scatter plot from given information & "eyeball" a line of best fit.
- 7. Make appropriate and efficient use of a scientific calculator. (Note: Students will be expected to demonstrate achievement of some objectives without the use of a calculator.)

# MTH 60 Beginning Algebra (MRC) (4 credits, variable):

- 1. Compute sums, differences, products and quotients of rational numbers.
- 2. Interpret the meaning of integer exponents in the context of multiplication, division, and raising powers to powers.
- 3. Solve linear equations in one variable.
- 4. Perform the operations of addition, subtraction and multiplication with polynomials.
- 5. Completely factor trinomials.
- 6. Produce the graphs of linear functions.
- 7. Solve systems of linear equations in two variables graphically, by addition and by substitution.
- 8. Add, subtract, multiply, and factor polynomials of several variables.

# MTH 65 *Elementary Algebra* (4 credits):

- 1. Maintain, use, and expand skills and concepts learned in previous mathematics courses.
  - A. Perform addition, subtraction, multiplication, and division of rational numbers.
  - B. Use and apply the concepts and language of algebraic expressions.
  - C. Solve linear equations and inequalities.
  - D. Interpret information represented numerically and graphically, and recognize the linear relationships represented verbally, numerically, graphically, and algebraically.
- 2. Solve linear systems of two equations algebraically and graphically.
- 3. Use linear systems to solve applications problems such as investment problems and mixture problems.
- 4. Use information given verbally, numerically, or graphically about a linear relationship between two variables to write a linear equation which models the relationship.
  - A. Use the slope-intercept form or the point-slope form of the equation of a line to develop linear models.
  - B. Apply the concepts of linear modeling to a real-world situation of interest to the student. (Students in lecture courses will complete a linear modeling project to demonstrate achievement of this objective.)
- 5. Recognize the relationship between the slopes of two lines that are parallel or two lines that are perpendicular.
- 6. Evaluate and simplify expressions using the laws of exponents
- 7. Use scientific notation.
- 8. Solve a formula for a specified variable.
- 9. Use square roots and cube roots.
  - A. Evaluate expressions involving square roots or cube roots.
  - B. Sketch and recognize the graph of the equation y = x and  $y = x^3$ .
  - C. Use the properties of square roots to simplify expressions involving

square roots and to perform operations with square roots.

- D. Solve equations involving a square or cube root.
- 10. Use the terminology of polynomials and perform algebraic operations with polynomials.
  - A. Recognize and use the terminology of polynomials.
  - B. Evaluate polynomials.
  - C. Add, subtract, and multiply polynomials.
- 11. Factor polynomials.
  - A. Factor polynomials by removing a common monomial factor.
  - B. Factor trinomials.
  - C. Factor special products.
- 12. Recognize and use quadratic equations.
  - A. Sketch the graph of a quadratic equation in two variables and identify the intercepts and the vertex graphically.
  - B. Solve a quadratic equation by factoring to determine the horizontal intercepts of a parabola.
- 13. Recognize values of a variable that make an algebraic fraction undefined, and reduce algebraic fractions to lowest terms.
- 14. Use algebra to solve application problems, including applications of the Pythagorean Theorem.
- 15. Make appropriate and efficient use of a scientific calculator. (Note: Students will be expected to demonstrate achievement of some objectives without the use of a calculator.)

# MTH 65 Elementary Algebra (MRC) (4 credits, variable):

- 1. Successfully add, subtract, multiply, and divide rational expressions and solve rational equations.
- 2. Perform algebraic operations with radicals and solve radical equations.
- 3. Solve quadratic equations.
- 4. Determine the equations of linear functions.
- 5. Solve elementary problems involving linear systems of equations.

#### MTH 70 Introductory Algebra (5 credits):

- 1. Maintain, use, and expand skills and concepts learned in previous mathematics courses.
  - A. Perform operations with fractions and decimals.
  - B. Have a sense of relative sizes of fractions, mixed numbers and decimals.
  - C. Have a sense of percents and use percents in common applications.
  - D. Recognize common geometric shapes and find perimeter and area of rectangles, triangles and circles.
- 2. Perform addition, subtraction, multiplication, and division of rational numbers.
- 3. Use and apply the concepts and language of algebraic expressions.
  - A. Use variables to construct algebraic expressions.
  - B. Evaluate algebraic expressions and simplify expressions using order of operations.
  - C. Simplify algebraic expressions by removing parentheses and combining like terms.
- 4. Solve linear equations and inequalities.
  - A. Solve linear equations algebraically, numerically, and graphically.
  - B. Solve linear inequalities algebraically and graph their solutions on a number line.

- 5. Use algebra to solve application problems.
  - A. Translate a verbal model into an algebraic expression and/or equation and solve the problem.
  - B. Solve problems using ratios and proportions.
  - C. Use unit analysis to solve problems.
  - D. Solve problems using similarity of shapes.
  - E. Solve problems using geometric formulas including the Pythagorean Theorem.
- 6. Interpret information represented numerically and graphically, and recognize linear relationships represented verbally, numerically, graphically, and algebraically.
  - A. Read and interpret information given in a table or from a graph.
  - B. Locate points in a rectangular coordinate system and represent equations in two variables graphically.
  - C. Identify the horizontal and vertical intercepts of the graph of an equation and interpret them in terms of an application.
  - D. Identify the slope of a line and interpret it in terms of an application.
  - E. Use the slope-intercept form of the equation of a line.
- 7. Create a scatter plot from given information and "eyeball" a line of best fit.
- 8. Solve linear systems of two equations algebraically and graphically.
- 9. Use information given verbally, numerically, or graphically about a linear relationship between two variables to write a linear equation which models the relationship.
  - A. Use the slope-intercept form or the point-slope form of the equation of a line to develop linear models.
  - B. Apply the concepts of linear modeling to a real-world situation of interest to the student. (Students in lecture courses will complete a linear modeling project to demonstrate achievement of this objective.)
- 10. Recognize the relationship between the slopes of two lines that are parallel or two lines that are perpendicular.
- 11. Evaluate and simplify expressions using the laws of exponents.
- 12. Use scientific notation.
- 13. Solve a formula for a specified variable.
- 14. Use square roots and cube roots.
  - A. Evaluate expressions involving square roots or cube roots.
  - B. Sketch and recognize the graph of the equations y = x and  $y = x^3 x$ .
  - C. Use the properties of square roots to simplify expressions involving square roots and to perform operations with square roots.
  - D. Solve equations involving a square or cube root.
- 15. Use the terminology of polynomials and perform algebraic operations with polynomials.
  - A. Recognize and use the terminology of polynomials.
  - B. Evaluate polynomials.
  - C. Add, subtract, and multiply polynomials.
- 16. Factor polynomials.
  - A. Factor polynomials by removing a common monomial factor.
  - B. Factor trinomials.
  - C. Factor special products.
- 17. Recognize and use quadratic equations.
  - A. Sketch the graph of a quadratic equation in two variables and identify the intercepts and the vertex graphically.
  - B. Solve a quadratic equation by factoring to determine the horizontal

intercepts of a parabola.

- 18. Recognize values of a variable that make an algebraic fraction undefined, and reduce algebraic fractions to lowest terms.
- 19. Make appropriate and efficient use of a scientific calculator. (Note: Students will be expected to demonstrate achievement of some objectives without the use of a calculator.)

# MTH 71 Informal Geometry 1 (2 credits):

- 1. Interpret and use the common vocabulary and symbols associated with elementary two and three-dimensional geometric shapes.
- 2. Interpret geometric drawings and sketch simple geometric drawings.
- 3. Use appropriate tools (rulers, protractors, compass, or possibly a computer) to create geometric drawings.
- 4. Apply inductive reasoning to elementary geometric relations.
- 5. Classify angles, triangles, polygons, and polyhedra.
- 6. Apply the commonly studied properties and relationships among lines, angles, polygons, and polyhedra.
- 7. Apply critical thinking and problem solving skills to appropriate problems of geometry.
- 8. Identify and sketch reflections, rotations, and translations of geometric figures.
- 9. Apply ideas of congruence to triangles. Apply SSS, SAS, and ASA.
- 10. Complete simple proofs.

# MTH 72 Informal Geometry 2 (2 credits):

- 1. Compute perimeters and areas of rectangles, triangles, parallelograms, trapezoids, circles and composite figures.
- 2. Compute volumes and surface areas of prisms, cones, cylinders, spheres, and composite shapes.
- 3. Apply the Pythagorean Theorem.
- 4. Recognize and sketch similar figures.
- 5. Apply ratios and proportions to compute lengths, surface areas, and volumes of similar shapes.
- 6. Apply simple trigonometric ratios.
- 7. Use terminology and relations in line segments, angles, and arcs related to circles.
- 8. Create reflections, rotations, translations, and proportional size changes on the coordinate plane.
- 9. Apply problem solving skills to three-dimensional shapes.
- 10. Recognize the uses of geometry in everyday life.

# MTH 76 Applied Geometry for Technicians (4 credits):

- 1. Determine angle measurements in drawings involving triangles, parallel lines, and central angles.
- 2. Use a protractor appropriately.
- 3. Name basic shapes and describe their properties.
- 4. Determine what folds up into a simple 3-D shape.
- 5. Apply properties of isosceles and equilateral triangles.
- 6. Utilize the US Customary and metric systems for length, area, and volume.
- 7. Use the US Customary and metric systems for temperature and weight.

- 8. Calculate perimeters, areas, volumes, and surface areas of geometric shapes.
- 9. Evaluate formulas related to geometric measure.
- 10. Solve formulas and simple equations for given variables.
- 11. Solve applied ratio and proportion problems.
- 12. Apply properties of similar triangles to find lengths.
- 13. Apply properties of right triangles and use the Pythagorean Theorem.
- 14. Apply trigonometric ratios to determine angles and lengths in right triangles.
- 15. Apply the Law of Sines and the Law of Cosines. (Optional)
- 16. Apply unit analysis to measurements including square and cubic units.
- 17. Use conversion charts to convert measurements.
- 18. Apply densities to determine weight or volume.
- 19. Solve application problems involving geometry and measurement appropriate to technical fields.
- 20. Simplify elementary algebraic expressions.
- 21. Solve elementary algebraic equations and formulas.

#### MTH 86 Applied Algebra for Technicians (4 credits):

- 1. Demonstrate an understanding of the vocabulary for each of the areas below:
  - A. Signed Numbers
  - B. Integer Exponents
  - C. Multi-step Formulas (including Variation)
  - D. Algebraic Expressions
  - E. Cartesian Coordinate System
  - F. Linear Equations
  - G. Quadratic Equations
- 2. Demonstrate the ability to solve problems using:
  - A. Signed Numbers
  - B. Integer Exponents
  - C. Multi-step Formulas (including Variation).
  - D. Algebraic Expressions
  - E. Cartesian Coordinate System
  - F. Linear Equations
  - G. Quadratic Equations
  - H. Analyze and solve problems using a variety of problem-solving techniques including patterns, tables, graphs and spreadsheets.
- 3. Demonstrate an ability to utilize a hand-held calculator successfully in solving a variety of problems.

#### MTH 90 Essentials of Algebra (MRC) (4 credits, variable):

- 1. Communicate with conventional symbolism the concept of function.
- 2. Factor second-degree polynomials.
- 3. Factor the sum of difference of two cubes.
- 4. Solve rational equations.
- 5. Extend the concepts and operations with exponents to include rational numbers.
- 6. Simplify radical expressions and solve radical equations.
- 7. Solve quadratic equations and equations of the quadratic type.
- 8. Identify and graph the equation of a circle whose center is shifted from the origin.
- 9. Identify and graph equations of conic sections whose center lie on the origin of the coordinate system.
- 10. Solve exponential and logarithmic equations.

11. Graph exponential and logarithmic functions.

12. Graph inequalities in two variables.

# MTH 95 Intermediate Algebra (5 credits):

- 1. Use prerequisite concepts and skills of the arithmetic of real numbers.
- 2. Manipulate and evaluate algebraic expressions.
- 3. Solve linear equations and apply linear equations to problems.
- 4. Solve and graph a linear inequality, and use interval notation.
- 5. Graph linear equations on a rectangular coordinate system.
- 6. Write the equation of a line.
- 7. Use function notations and distinguish between input and output.
- 8. Solve a linear 2 by 2 system.
- 9. Perform operations involving polynomials.
- 10. Factor polynomials.
- 11. Solve polynomial and quadratic equations by factoring.
- 12. Apply rules of exponents, and use scientific notation.
- 13. Simplify and perform operations involving rational expressions.
- 14. Solve equations containing rational expressions.
- 15. Simplify and perform operations involving radicals and rational exponents.
- 16. Solve equations involving radical expressions.
- 17. Write the square root of a negative number in terms of i, and operate with complex numbers.
- 18. Solve quadratic equations by taking square roots, by completing the square, and by the quadratic formula.
- 19. Given a quadratic function find it vertex, axis of symmetry, intercepts and graph the parabola.
- 20. Evaluate an exponential function.
- 21. Translate between exponential and logarithmic notations.
- 22. Model and solve application problems.
- 23. Use a scientific calculator when appropriate and in an efficient manner.

# MTH 96 Using the Scientific Graphing Calculator (1 credit):

- 1. Utilize all of the college algebra level functions and mode settings on the graphing calculator.
- 2. Correctly enter and evaluate a function and compare results with a mental estimate.
- 3. Correctly set and modify a viewing window to capture a function's important graphical features.
- 4. Utilize the calculator's memory to store, recall, and use, numeric values and expressions.
- 5. Correctly solve equations graphically that are studied in intermediate algebra and compare the graphical solution with mental and pencil/paper estimates.
- 6. Utilize a variety of other calculator features learned as time permits.
- 7. Enter and execute elementary programs.

# MTH 97 *Geometry* (4 credits):

- 1. Use inductive reasoning to discover geometric relationships.
- 2. Classify shapes into appropriate categories.
- 3. Use the common terminology associated with 2 and 3 dimensional figures.

- 4. Apply the properties and relationships involving lines, angles, polygons, & circles.
- 5. Understand concepts of perimeter, area, volume, and surface area.
- 6. Use Pythagorean Theorem in a variety of situations.
- 7. Use the trigonometric relations in right triangles containing 30, 45, and 60 angles.
- 8. Use similarity concepts to find lengths, areas, and volumes.
- 9. Use the basic tools of geometric measurement such as protractors and rulers.
- 10. Use tools such as the compass or computer to create geometric designs.
- 11. Draw simple 2 and 3 dimensional shapes.
- 12. Solve problems involving cross sections of solids.
- 13. Identify congruent triangles based on SSS, SAS, and ASA principles.
- 14. Recognize examples of geometry in nature, architecture, and design.
- 15. Solve application problems which require drawing a picture, recognizing the geometry involved, and applying geometric principles.
- 16. Use algebra to solve geometric problems.
- 17. Understand and write simple proofs.

#### MTH 105 Intro to Contemporary Mathematics (4 credits):

- 1. Be familiar with and be able to employ aspects of mathematical and logical thinking in various fields.
- 2. Develop an appreciation of the relationship mathematics has to other major branches of knowledge (e.g., art, music, sociology, geography).
- 3. Be familiar with mathematical models of various types; (e.g. linear, exponential and logarithmic functions, etc.).
- 4. Be familiar with some uses of statistics in common practice.

#### MTH 111 College Algebra (5 credits):

- 1. Maintain, use, and expand the skills and concepts learned in previous mathematics courses.
- 2. Apply the midpoint formula, distance formula, properties of lines, and equations of circles to the solution of problems from coordinate geometry.
- 3. Use and apply the concepts, language, notation, and evaluation of functions, including input-output ideas, domain, range, increasing, decreasing, maximum values, minimum values, symmetry, odd, even, composition of functions, and inverses.
- 4. Use substitution to create an equation defining one quantity as a function of another.
- 5. Apply principles of transformations (shifts, reflections, and stretches) to equations and graphs of functions.
- 6. Recognize, sketch, and interpret the graphs of the basic functions without the use of a calculator.
- 7. Identify and apply properties of polynomial functions.
- 8. Solve nonlinear systems of equations algebraically and graphically.
- 9. Identify and apply properties of rational functions with and without a calculator.
- 10. Identify and apply properties of exponential and logarithmic expressions & functions.
- 11. Analyze a function by interpreting its graph, using a graphing calculator.
- 12. Translate a set of numerical data into graphical form; choose a function (linear, power, exponential, logarithmic, or logistic) to model the data, and interpret the implications of the model.
- 13. Translate word problems into mathematical expressions, solve the problems, and interpret the solutions.

- 14. Communicate ideas of college algebra through English statements and mathematical sentences.
- 15. Use the language and skills of pre-calculus, which are important for success in calculus.
- 16. Write and evaluate the notation of sequences and series including nth terms, summations, and factorials.
- 17. Identify sequences as arithmetic, geometric, or neither and apply appropriate formulas related to those sequences to solve problems.
- 18. Apply the Binomial Theorem and Pascal's Triangle to binomial expressions.
- 19. Accurately apply the mathematics learned in college algebra to a topic from the student's world.

# MTH 112 Trigonometry (4 credits):

- 1. Use geometry, algebra, and graphing calculator skills from previous courses;
- 2. Move easily between degree and radian measure;
- 3. Identify and use the six trigonometric functions in right triangle applications;
- 4. Identify, apply, and interpret features of the equations and graphs of the six circular functions;
- 5. Recall and apply the basic trigonometric identities;
- 6. Use the sum, difference, double-angle, and half-angle identities;
- 7. Identify features of and use the three major inverse trigonometric functions;
- 8. Solve trigonometric equations analytically and with graphing technology;
- 9. Apply the Law of Sines and Law of Cosines where appropriate;
- 10. Use polar coordinates and polar equations and transform them to rectangular form and back.
- 11. Use complex numbers in standard form and in polar form (time permitting);
- 12. Solve problems using vector notation;
- 13. Use parametric equations;
- 14. Work with the definitions, equations, and graphs of conic sections;
- 15. Apply geometric and trigonometric relationships to appropriate multi-step problems;
- 16. Use a graphing calculator to graph equations and explore concepts for equations in rectangular, parametric, or polar form.

# MTH 211 Fundamentals of Elementary Mathematics 1 (4 credits):

- 1. Recognize and use problem solving strategies to solve routine and non-routine problems.
- 2. Use calculators and/or computers while exploring elementary mathematics topics.
- 3. Understand and apply the concept of a set, relationships between sets, operations on sets, and be able to use set notation correctly.
- 4. Use sets to develop the concept of number and operations with whole numbers and integers.
- 5. Recognize and apply the interpretations for the operations of addition, subtraction, multiplication and division with whole numbers and integers.
- 6. Use a variety of manipulatives to model numeration systems and operations with whole numbers and integers.
- 7. Justify algorithms for whole numbers and integers by identifying the mathematical properties used.
- 8. Apply number theory concepts such as divisibility, factors, multiples and divisors to whole numbers.
- 9. Use techniques of estimation and mental mathematics with whole numbers and

integers.

- 10. Recognize and extend patterns of numbers, objects or symbols in a variety of ways.
- 11. Demonstrate the concept of a function using patterns, graphs, models and/or sequences.
- 12. Use calculators and/or computers to explore graphs of functions.
- 13. Use vocabulary for problem solving, logic, sets, whole numbers, integers, and functions, correctly.
- 14. Reason deductively and inductively to solve a variety of problems.
- 15. Solve both routine and non-routine problems related to whole numbers, functions, set theory and number theory.

# MTH 212 Fundamentals of Elementary Mathematics 2 (4 credits):

- 1. Apply the problem solving skills learned in Math 211 to the topics of ratio and proportion, percent, real numbers, probability and statistics.
- 2. Use a variety of models to illustrate properties and operations with fractions, decimals and irrational numbers.
- 3. Use techniques of estimation and mental computation with fractions, percent and decimals.
- 4. Explore properties and applications of irrational numbers, using a variety of methods.
- 5. Use exponential and scientific notation correctly.
- 6. Gather and display data in various ways, such as stem and leaf plots, line graphs and bar graphs.
- 7. Calculate and interpret measures of central tendency and of dispersion.
- 8. Identify misuses of statistics.
- 9. Explore experimental and theoretical probabilities in a variety of ways.
- 10. Explore and create simulations of experiments.
- 11. Compute probabilities of outcomes and events using a variety of methods.
- 12. Apply probability knowledge to data and distributions of data.
- 13. Compute and apply odds and expected value.
- 14. Use vocabulary for ratio and proportion, percent, real numbers, probability, and statistics correctly.
- 15. Solve both routine and non-routine problems related to ratio and proportion, percent, real numbers, probability and statistics.

#### MTH 213 Fundamentals of Elementary Mathematics 3 (4 credits):

- 1. Apply the problem solving skills learned in Math 211-212 to systems of measure, two and three dimensional geometry, symmetry, congruence, similarity, geometric constructions, tessellations, coordinate and transformational geometry, and LOGO (or other computer software).
- 2. Solve problems using dimensional analysis.
- 3. Estimate measurements in both English and metric.
- 4. Solve problems using measurement formulas and understand how different systems are related.
- 5. Compute or estimate perimeter, area, volume and/or surface area of a given figure in a variety of ways.
- 6. Explore properties of two and three-dimensional figures in a variety of ways.
- 7. Apply geometric relationships to create tessellations.
- 8. Identify and classify polyhedra by properties and type.
- 9. Construct geometric models.

- 10. Explore congruence (similarity) of two geometric shapes using a variety of methods.
- 11. Explore LOGO or other geometric software.
- 12. Explore geometric constructions with compass and straightedge or computers.
- 13. Explore transformations of the plane in a variety of ways.
- 14. Solve both routine and non-routine problems related to measurement and geometry.

# MTH 231 Discrete Mathematics 1 (4 credits):

- 1. Use propositional calculus notation and techniques to determine the validity of logical statements and proofs.
- 2. Apply techniques of mathematical induction to proofs
- 3. Apply recursion to sequences. Use recursive definitions. Use recursion in logical arguments.
- 4. Use set theory in logical arguments and boolean algebra.
- 5. Use elementary combinatorics techniques including combinations and permutations to enumerate sets.

# MTH 232 Discrete Mathematics 2 (4 credits):

- 1. Apply notation and techniques to functions, inverse functions and composition of functions.
- 2. Use polynomial and exponential models to describe growth rates of algorithms.
- 3. Evaluate the efficiency of common algorithms using O-Notation.
- 4. Apply notation and techniques to relations and partially ordered sets.
- 5. Understand terms commonly associated with Relations, Functions, Matrices, Graph Trees.
- 6. Do preorder, inorder, postorder traversals of trees.
- 7. Use Dijkstra's, Prim's and Warshall's algorithms.
- 8. Prove elementary properties of graphs and trees.
- 9. Use Dijkstra's, Prim's and Warshall's algorithms.
- 10. Determine and describe Hamiltonian and Euler circuits.

#### MTH 233 Discrete Mathematics 3 (4 credits):

- 1. Use polynomial and exponential models to describe growth rates of algorithms.
- 2. Evaluate the efficiency of common algorithms using O-Notation.
- 3. Apply notation and techniques to relations and partially ordered sets.
- 4. Simplify elementary finite state automata.
- 5. Employ elementary notation and techniques to analyze problems involving graphs and trees.

# MTH 241 *Elementary Calculus 1* (4 credits):

- 1. Find limits for various functions and solve continuity problems.
- 2. Solve rate of change problems.
- 3. Find derivatives of single variable functions by definition and by rules.
- 4. Differentiate logarithmic and exponential functions by rules.
- 5. Solve exponential growth and decay problems, as time permits.
- 6. Use computer spreadsheets, calculators, and handwork to compute present value, future value, and annuity payments.

- 7. Employ handwork and graphing calculators to graph, differentiate, and find increasing and decreasing intervals, find maximums and minimums, concavity, points of inflection, and find intercepts.
- 8. Solve maxima and minima application problems.
- 9. Solve Business problems using geometry and derivatives.
- 10. Solve Business applications of elasticity.
- 11. Use implicit differentiation and related rates to solve Business and Social Science applications.
- 12. Find simple/compound interest and solve applications.
- 13. Find future value/present value of annuities and solve applications.
- 14. Find amortization payments and set up schedules.
- 15. Use data to find regression functions for applications.
- 16. Use spreadsheets for some labs.
- 17. Use graphing calculators to graph functions to check their calculus handwork.

#### MTH 242 Elementary Calculus 2 (4 credits):

- 1. Find anti-derivatives of single variable functions.
- 2. Find indefinite integrals for polynomial, exponential, logarithmic functions.
- 3. Calculate definite integrals for polynomial, logarithmic, exponential functions.
- 4. Apply integration techniques to find areas under and between curves.
- 5. Find volumes of solids of revolution.
- 6. Find the average value of a function.
- 7. Find derivatives of functions of several variables.
- 8. Find partial derivatives of functions of two variables.
- 9. Find relative extrema for two variable functions.
- 10. Graph 3-D functions.
- 11. Apply technique of Lagrange multipliers to maximize or minimize a function with a constraint.
- 12. Solve independent systems of equations with one solution.
- 13. Solve dependent systems of equations with parameterized solutions.
- 14. Set up linear programming problems and use XL solver to solve.
- 15. Employ graphing calculator and spreadsheets to graph functions appropriately and find maximums, minimums, intercepts, solutions to system of functions, and numerically integrate.

#### MTH 243 Intro to Probability and Statistics (4 credits):

- 1. Use statistical calculator functions to assist in calculations.
- 2. Define statistics and probability and know their relationship.
- 3. Construct frequency distributions and histograms.
- 4. Define calculate and employ: mean, median, mode, variance, standard deviation, range, measures of central tendency, variability and be able to discuss their practical significance.
- 5. Define the meaning of Random Variable.
- 6. Construct a probability distribution given a set of conditions.
- 7. Calculate Mathematical Expectation.
- 8. Calculate mean and variance for the binomial distribution.
- 9. Select appropriate Null Hypothesis and Alternative Hypothesis.
- 10. Test Hypotheses (rejection or acceptance). Using the appropriate distribution including normal, chi squared, F, Student's t, r, and binomial.
- 11. Define Normal Probability Distribution and understand the significance of Central

Limit Theorem.

- 12. Demonstrate understanding of area under the normal curve and the meaning of Standardized Normal Distribution (z values).
- 13. State meaning of "Rejection Region" in hypothesis testing.
- 14. Calculate point estimators and confidence intervals of population parameters.
- 15. Compare 2 means using appropriate distribution.
- 16. Compare 2 variances using the F distribution.
- 17. Calculate (determine) a Linear Regression Line by the least squares method.
- 18. Calculate a correlation coefficient and state whether or not it is significant.
- 19. Use contingency tables and chi-squared distribution to analyze multinomial data.
- 20. Use ANOVA (analysis of variance) and F distribution to compare means of equal and unequal sizes samples.
- 21. Compute the required sample size if given the allowable error and degree of confidence.

# MTH 251 Calculus 1 (Differential Calculus) (5 credits):

- 1. Find derivatives numerically utilizing technology by taking arbitrarily fine difference quotients.
- 2. Visualize and interpret derivatives of combinations of elementary functions graphically.
- 3. Interpret the meaning of difference quotients, first and second derivatives in various applications.
- 4. Understand local linearity and recognize the derivative as a function on its own right.
- 5. Understand the definition of the derivative and have basic proficiency at differentiating

elementary functions and their combinations.

- 6. Apply derivatives in solving problems where insight is gained by understanding increasing and decreasing behavior, concavity, inflection, maxima, and minima.
- 7. Utilize a programmable graphing calculator as an effective tool in confirming analytical work and interpreting numerical and graphical information related to differential calculus.

# MTH 252 Calculus 2 (Integral Calculus) (5 credits):

- 1. Predict and calculate total distance traveled, given velocity information as either tabular data, a graph, or as an equation.
- 2. Compute Riemann sums numerically and understand their relationship to the definite integral.
- 3. Have a good grasp of the definite integral as a limit of Riemann sums.
- 4. Interpret the definite integral as total change, area, and average value.
- 5. Compute definite integrals by using the fundamental theorem and by numerical methods.
- 6. Identify improper integrals that converge or diverge and compute their values where possible.
- 7. Integrate using basic rules and by using the substitution method and integration by parts.
- 8. Compare closed form definite integrals with approximations by numerical methods.
- 9. Compute volumes and surface areas of solids of revolution.
- 10. Compute arc lengths of elementary functions.

#### MTH 253 Calculus 3 (Infinite Series & Sequences) (4 credits):

- 1. Extend their integration skills.
- 2. Develop a more thorough understanding of plane analytic geometry.
- 3. Develop the concept of a converging series and their application to computation of function values.
- 4. Further their mathematical maturity.

### MTH 254 Vector Calculus 1 (Intro to Vectors and Multi-dimensions) (4 credits):

Upon successful course completion students will demonstrate adequate understanding of:

- 1. Introductory two and three dimensional vector algebra skills including graphics, dot and cross products, projections of vectors, use and application of unit, tangent, normal, and binomial vectors;
- 2. Rectangular, cylindrical, and spherical coordinate systems in three dimensions, including applications to quadric surfaces, other surfaces, and volumes;
- 3. Parametric equations of lines in space;
- 4. Vector valued functions, the calculus of such functions including curvature, position, velocity, and acceleration;
- 5. Functions of two or more variables, partial derivative, tangent planes, total differentials, directional derivatives, gradients, and maximum/minimums of functions of two variables;
- 6. Introductory level double integrals.

#### MTH 255 Vector Calculus 2 (Intro to Vector Analysis) (4 credits):

Upon successful course completion students will demonstrate adequate understanding of:

- 1. Double Integrals, Rectangular coordinates.
- 2. Polar Coordinates and Applications to Area, Volume and Surface Area.
- 3. Triple Integrals; Rectangular, Cylindrical and Spherical coordinates.
- 4. Line Integrals.
- 5. Green's Theorem; Intro to Surface Integrals.
- 6. Divergence Theorem; Stokes Theorem.
- 7. Flux, Curl and applications.
- 8. Advanced Topics and Applications.
- 9. Advanced Topics.

#### MTH 256 Applied Differential Equations (4 credits):

Upon successful completion of this course, the student will:

- 1. Learn methods of solving 1st order linear Differential Equations (D. E's), a selected number of 1st order non-linear D. E's and higher order D. E's with constant coefficients, both homogeneous and non-homogeneous.
- 2. Realize that many problems cannot be satisfactorily solved by elementary analytical techniques and learn ways of approximating solutions numerically.
- 3. Do problems using these formal procedures to solve mechanical, electrical, etc., problems in engineering.

#### MTH 261 Intro to Linear Algebra (4 credits):

- 1. Apply properties of matrix algebra to solve systems of linear equations.
- 2. Apply properties of vector algebra to solve two- and three-dimensional geometric problems.
- 3. Describe a linear transformation given the corresponding matrix, and find a matrix given the description of the linear transformation.
- 4. Test a set of vectors for linear independence.
- 5. Solve eigenvalue/eigenvector problems.
- 6. Further their mathematical maturity.

#### MTH 261A Intro to Linear Algebra (narrower focus) (2 credits):

See Mth 261outcomes above.

#### Mathematics Unit Planning Chapter 2: Mathematics Instructional Methods

# **INSTRUCTIONAL METHODS, DELIVERY MODES, COURSE & STAFF AVAILABILITY**

- The Mathematics Division strategically grows learning opportunities by
  - Developing/revising/revamping curriculum and incorporating technology to meet national standards and program needs;
  - Course Availability:
    - Scheduling classes for the convenience of students (offering a variety of times and days, evenings and Saturdays);
    - Providing different modes of instruction (open-entry, variable credit, modularized instruction, different tracks);
    - Outreach center availability; and
    - Appropriate placement.
  - Instructor and Staff Availability:
    - Providing significant opportunities for interaction with students inside and outside the classroom;
    - Providing office hours and TBA opportunities;
    - Extensive free tutoring support via the Math Resource Center; and
    - Providing, equipping, and staffing a Mathematics Computer Lab.

#### Mathematics Unit Planning Chapter 5: Mathematics Initiatives to Improve Performance

# The following statement applies to all Mathematics Initiatives and will only be listed once below:

**INITIATIVE ARTICULATION WITH COLLEGE'S VISION, MISSON, & GOALS:** These initiatives will assist the Mathematics Division in articulating the College's vision of providing learning opportunities for our students to transform their lives. These initiatives will further enable the Mathematics Division to align with the College's Mission of providing quality educational opportunities for our students. These initiatives support Lane's Core Values by enabling the Mathematics Division to provide an environment that respects the needs and potential of each student through fairness, honesty, and openness.

The result of these initiatives will enable the Mathematics Division to:

- Cultivate respectful, inclusive, and accessible learning environments;
- Respond to demographic changes and internal challenges;
- Consistently and effectively respond to the challenges of a changing technological community and workplace;
- Remove barriers to learning for our students; and
- Improve and strengthen our students' quantitative literacy.

# **\*\*MATHEMATICS INTIATIVES\*\***

#### **DEPARTMENT:** Mathematics

# **PRIORITY #1**

INITIATIVE TITLE: Mathematics Computer Lab Equipment Replacement SCIE/MATH Room 222

**DESCRIPTION:** Replace 26 CPU's in the Mathematics Computer Lab, SCIE/MATH Room **222** (on a three year cycle). The current lab's computers were purchased from 9/1999 (18 machines) through 5/2001 (8 machines).

**RESOURCES NEEDED:** \$26,000 for 26 CPU's and software.

**FUNDING SOURCES:** TACT funds (non-recurring). Will be requested every three years from TACT funds, however.

#### **TACT Funds**

- Category of request: Maintain existing technology.
- How does this request fit in with other unit or college technology plans? An integral part of the College and Mathematics Division mission is to provide and maintain instructional facilities at an adequate level, especially where computer technology is used. Developmental, Professional-Technical, and Lower Division College Transfer courses are scheduled in

this room throughout the year. The room is also used as a drop-in mathematics open computer lab for students with assistance available.

The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by replacing equipment in a timely fashion. We are minimizing barriers to learning by maintaining a computer lab with current equipment. We *place students at the heart of what we do*, by having current equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

 Cost breakdown, including any unit resources being applied to project: SCIE/MATH Room 222: 26 computer CPUs @ \$1000 = \$26,000

Part-time staff and other units on campus that might be requesting computers may use the majority of the computers being replaced.

The Division is able to update the software used on these computers from unit funds.

#### **INITIATIVE TITLE:** Mathematics Instructor

**DESCRIPTION:** This initiative would contribute to reducing the shortage of full-time instructors in the Division and improving our part-time to full-time ratio.

Currently not counting release for grant and other leaves there are 15 FTE contracted fulltime faculty (16 with the MRC Director who teaches only for the Science Division engineering transfer courses). This last year the Division served over 1062 student FTE [From IRAP (August 2003) Enrollment Reports 2002-03, page 4]. We are the largest Division at Lane Community College if Cooperative Ed FTE is extracted. Factoring in releases for grant and other leaves, the contracted full-time faculty FTE was reduced to 13.8 FTE full-time contracted faculty Spring 2003 in our division teaching courses. This Fall and Winter there are 14.8 FTE full-time faculty teaching math and pre-engineering courses.

If Cooperative Ed FTE is included (see page 3 of the 2002-03 IRAP Enrollment Report) we are the second largest division. Yet the number of full-time contracted faculty in our division is substantially less (15) than in similar producing FTE divisions. The Social Science Division produced 1142 student FTE (see page 3 of the above report) with 23 fulltime contracted faculty, English, Foreign Language and Speech produced 1034 student FTE (see page 3 of the above report) with 28 full-time contracted faculty, and Science produced 1045 student FTE (see page 3 of the above report) with 17 full-time contracted faculty. Our actual head count part-time to full-time ratio is approximately 2 to 1. For P'03 there were 30 part-time faculty to 15 (only 13.8 were not on release) full-time contracted faculty; F'03 it was 32 to 14.8, W'04 it is 29 to 13.8. If you compare the number of credit sections taught by full-time faculty to part-time faculty it is full-time faculty teaching (P'03+F'03+W'04: 45 + 45 + 41) 131 sections and part-time faculty teaching (P'03+F'03+W'04: 35+59+53) 147 sections. These numbers do not include the 28 sections of MRC classes offered each term. The conclusion to be drawn is that part-time faculty are teaching substantially more of our courses than contracted full-time faculty. This initiative seeks to adjust this imbalance in order to provide more adequate ratio of full to part-time faculty and therefore better meet Lane's vision and mission of providing quality-learning opportunities for our students.

**RESOURCES NEEDED:** 1.0 FTE contracted faculty. Payroll with OPE is \$67,088 (Level 2 Step 5).

**FUNDING SOURCES:** General Fund (recurring).

#### **INITIATIVE TITLE:** Mathematics/Engineering Instructor

**DESCRIPTION:** This initiative would contribute to reducing the shortage of full-time instructors in the Division and improving our part-time to full-time ratio. If you compare enrollment, section count, FTE, and income data from key instructional divisions it is apparent that the Mathematics Division is significantly understaffed with full time faculty (please see priority #2 comments). Priority #3 is to hire one full-time contracted faculty member with mathematics/engineering background. The full-time contracted faculty member would be part of the Mathematics Division (as are Cathy Miner and Robert Thompson; both who teach engineering transfer courses) and would cross teach mathematics and engineering transfer courses in both the Mathematics & Science Divisions.

This would benefit both divisions by reducing Mathematics' part time faculty needs and would provide a talented pool of faculty to augment the Science Division's instructional needs.

This initiative seeks to provide more adequate ratio of full to part-time faculty and therefore better meet Lane's vision and mission of providing quality-learning opportunities for our students.

**RESOURCES NEEDED:** 1.0 FTE contracted faculty. Payroll with OPE is \$67,088 (Level 2 Step 5).

**FUNDING SOURCES:** General Fund (recurring).

#### **INITIATIVE TITLE:** Developmental Algebra Study and Review

**DESCRIPTION:** The Mathematics Division will launch a review of and restructure the developmental curriculum. The purpose of this restructuring is to improve student success and retention in developmental mathematics and also to streamline existing courses.

As in many institutions, students at Lane are able to meet their algebra requirements in a variety of ways. There is a three-term independent study sequence available through the MRC. There is a two-term option (Math 70/95), a three-term option (Math 60/65/95), and a three-term professional-technical option (Mth 76/86/95). Students may also meet their algebra requirements through "credit-by-exam." We were successful in obtaining a FIPSE (Fund for the Improvement of Post-Secondary Education) grant for \$398,484. The proposal was for Flexible Sequence Algebra (FSA). The objective of FSA is to improve student retention and success in developmental algebra by breaking the curriculum into smaller units (modules), providing a venue to repeat smaller units (recycling), while retaining an instructor-led classroom environment.

Unfortunately, students struggle with the different options, which use different approaches, textbooks, and supplementary materials. The options also have different starting and ending points, which hinders student success. Thus, the need for us to launch a review to streamline and restructure the developmental curriculum. We believe that linking syllabi, when possible, and launching a review to restructure and streamline the developmental curriculum is necessary to improve teaching and student achievement at Lane.

**RESOURCES NEEDED:** 100 hours = \$2,594 in curriculum development funds

**FUNDING SOURCES:** Curriculum Development (non-recurring).

#### **INITIATIVE TITLE:** Structure, Procedures, and Pedagogy Study

**DESCRIPTION:** To complete an aggressive study on how other Mathematics Divisions do things at other schools. What is their class structure? What delivery methods and modes of instruction do they utilize? What kinds of procedures do they have in place to ensure student success and effective learning environments for their students? Explore and assess pedagogical methods, changes, and implementations at sister institutions.

This study would be done locally, statewide, regionally, and nation-wide tapping colleagues through regional and national organizations such as ORMATYC, AMATYC, NCTM, and MAA.

**RESOURCES NEEDED:** 100 hours = \$2,594 in curriculum development funds

**FUNDING SOURCES:** Curriculum Development (non-recurring).

# **INITIATIVE TITLE:** Overcoming Math and Test Taking Anxieties

**DESCRIPTION:** Develop and teach a two-week (could be 10 sessions) course on overcoming math and test taking anxieties. This could be a "summer institute" or a pre-fall term class to help students get a jump-start on the academic year.

<b>RESOURCES NEEDED:</b>	20 hours = \$519 in curriculum development funds and \$983 for a 1-credit release backfill for instructor.
FUNDING SOURCES:	Non-recurring curriculum development funds/Recurring General Fund.

#### **INITIATIVE TITLE:** Part/Full-Time Mentoring

**DESCRIPTION:** Division will establish an on-going full-time/part-time mentoring structure by which each full-time instructor will ensure that his/her part-time instructor group is adequately informed about division procedures, and about all resources available to optimize students' success.

**RESOURCES NEEDED:** \$3,932 for a 4-credit release backfill for facilitator/coordinator

**FUNDING SOURCES:** Recurring General Fund

**INITIATIVE TITLE:** Improve student retention

**DESCRIPTION:** A team of full-time/part-time instructors will research and study the factors contributing to student retention in the current learning environment and make recommendations for improvement to the Division.

**RESOURCES NEEDED:** \$3,932 for a 4-credit release backfill for principal investigator

FUNDING SOURCES: Non-recurring General Fund

#### **INITIATIVE TITLE:** Design and establish dedicated share time

**DESCRIPTION:** A team of full-time/part-time instructors will research and study the scheduling/workload problems which prevent the division from establishing an on-going forum for improving teaching and learning in the Mathematics Division, and will make a recommendation to the Division based on it's findings.

**RESOURCES NEEDED:** \$983 for a 1-credit release backfill for principal investigator

FUNDING SOURCES: Non-recurring General Fund

#### **INITIATIVE TITLE:** Division Business

**DESCRIPTION:** Full-time instructors (with Division Meeting Chair Responsibilities) will rotate each year into an administrative-assisting role (working with and reporting to Division Chair as part of the Mathematics Advisory Committee: MAC) to keep important division goals moving forward. Instructors will receive partial teaching-load release for this work.

**RESOURCES NEEDED:** \$11,796 for three-4 credit release backfills (one each term).

**FUNDING SOURCES:** Recurring General Fund and existing division funds

#### **INITIATIVE TITLE:** Math Resource Center (MRC) Tutoring Support

**DESCRIPTION:** This initiative would enable the MRC to adequately meet student demand. Currently, the MRC is extremely busy every day of the week. Sometimes 5 or 6 students, at a time, are waiting to be served by 5 tutors. The students can wait up to 15 or 20 minutes for assistance. The continual demand adds to student's frustration and creates a significant stress level for our contracted staff. The Division is concerned that we might lose talented and experienced tutors due to burnout.

Currently, we are open 40 hours per week, but we have only one 25 hour per week testing specialist (service counter person), and only 5 tutors two of whom work 25 hours per week (including summer term) and three at 30 hours per week (who do not work summer term). They are classified as instructional support specialists and work in room 163 that serves developmental math students. We are also allocated about 20 hours per week from Division ICP funds for timesheet staffing and tech support.

At the service counter our aide handles make-up lecture class and MRC testing intake (40-98 tests per day), check-in/out videos on all math topics, and the MRC Director handles enrollment clearing and advising. Frequently there are several students waiting for assistance. The MRC Director spends a significant portion of each day assisting our aide at the counter.

In our developmental math tutoring room, #163, we average over 700 student contacts per week. Waiting times are problematic.

In room 177 we provide tutoring for transfer level math students (Math 105-256). One faculty position staffs this room from 9am to 3pm daily. These positions are part of 6 full time faculty's workload. Tutoring Services and Learn & Earn tutors help in this room. They provide 50 to 60 hours per week and 28 to 32 hours of tutor time per week, respectively. Their schedules provide coverage from 8am until 7pm. Frequently there are 3 or 4 students waiting for assistance.

This initiative seeks to add two 25 hours per week Instructional Support Specialist positions. This increase in staffing would lessen student waiting time, offer some flexibility to tutors for breaks, and would allow for a tutor to assist the aide at the service counter during peak demand.

We would still continue to utilize Tutoring Services and Learn & Earn tutors.

**RESOURCES NEEDED:** Two (2) 25 hour each, 1040 hours/year (0.50 FTE) contracted part-time classified staff: Instructional Support Specialists. Total payroll for both with OPE is \$42,808 (Level 8 Step 4).

**FUNDING SOURCES:** Recurring General Fund

# **INITIATIVE TITLE:** Computer Lab Support (Begin date is 9/1/2006)

**DESCRIPTION:** This initiative would enable the Mathematics to continue to adequately staff the Mathematics Computer Lab. We need to have a responsible knowledgeable individual available to our students whenever the lab is open. We also need the lab to be maintained and the software and equipment kept up-to-date. Responsibilities include:

1. Opening & closing the lab:

Turn on as many machines as appropriate for the day's use. Turn off machines at the end of the lab hours except if others have arranged to use the lab. Make sure all doors to the lab are locked at closing time.

- 2. Daily maintenance items: Check the printer paper, pick up trash and straighten the lab. Make sure cables are out of the way of people and chair rollers. Erase obsolete writing from the white board.
- 3. Other maintenance items. Clean the computer screens, keyboards and other equipment. Clean the mouse rollers and ball. Clean up at the end of the term.
- 4. Lab rules:

Enforce the lab rules and keep rule signage up to date. Be aware of what is going on in the lab. No food or drink is allowed in the lab-- students can leave these items by the door. No private email or recreational net surfing. The lab is for mathematics schoolwork only. No outside work or printing may be done in the lab; for example, students may not come to print their sociology papers. See the faculty member in charge if you need help enforcing the rules. Try to stay calm and pleasant while firmly restating the rules. Assume any breach of the rules is because the student was unaware. Repeat offenders will not be allowed to use the lab.

- 5. Help instructors and their students when they hold classes in the lab. Maintain the instructor sign-up sheets.
- 6. Software:

Keep the machines running in the lab, by fixing corrupted or hacked software. Keep a consistent interface on the screens. Help make the computers easy to use by maintaining a reasonable file structure. Clean out old student work at the end of the term. Back up software. Restore and reinstall software.

- 7. Help students download calculator programs. Maintain and ensure the calculator program files that are accessible to all students.
- 8. Coordinate with the faculty supervisor on use of the lab--anything that might be important--for example a faculty member wants to put a program on the lab computers.
- 9. Maintain a list of licensed software and the number of licenses. Only licensed software is allowed on school computers.
- 10. See that broken equipment is serviced promptly: This includes preparing an electronic service order, informing the faculty supervisor, getting signatures, and delivering and picking up the equipment at the repair shop if necessary.
- 11. Professional Attitude. Remember we are here to serve the students. Many students are anxious about seeking help or afraid to appear foolish, so it is good to be positive with them. When answering a student's questions avoid taking over their controls. Have the student do as much as possible.

**RESOURCES NEEDED:** 1.0 FTE contracted full-time classified staff: Instructional Support Specialist. Payroll with OPE is \$42,808 (Level 8 Step 4).

If **not** granted from General Fund the Mathematics Division requests from **TACT** two (2) less than 1040 time sheet hour amounts (at the Instructional Support Specialist level 8 step 4, \$13.73 /hr.) not to exceed \$37,783.

FUNDING SOURCES:General Fund (recurring). Begin date is 9/1/2006.<br/>[Or TACT funding for equivalent time sheet dollars ('06/'07)<br/>(non-recurring) if General Fund dollars not available.]<br/>Note: will be requested each year from TACT funds.

#### IF TACT Funds (Note: Begin date is 9/1/2006)

- Category of request: Maintain existing and/or supporting technology.
- > How does this request fit in with other unit or college technology plans?

An integral part of the College and the Mathematics Division mission is to provide adequate staffing support wherever computer technology is used. Developmental, Professional-Technical, and Lower Division College Transfer courses are scheduled in this room throughout the year. The room is also used as a drop-in mathematics open computer lab for students with assistance provided.

Cost breakdown, including any unit resources being applied to project: Mathematics Division requests from TACT two (2) less than 1040 time sheet hour amounts (at the Instructional Support Specialist level 8 step 4, currently is \$13.73 /hr.) not to exceed \$37,783.

> \$13.73 \* 1040 \*1.323 = \$18,891.38 \$13.73 \* 1040 \*1.323 = <u>\$18,891.38</u> Totals = \$37,782.76 (This is a maximum dollar amount, actual will be less due to contractual use of time-sheet employees limitations)

#### **INITIATIVE TITLE:** Part-time faculty support

**DESCRIPTION:** This part-time faculty support person will: Gather materials that are new, updated, and of interest to include in the Faculty Handbook for Full and Part Time Prepare for in-service meeting with part time faculty. Faculty. (Handouts, new information, procedures for faculty, items of interest, where they can find resources, etc.) Show and guide part time faculty through copier procedures, mailroom, supply area, paper area, manipulatives, who to get books and calculators from, etc.) Answer or get answers for any questions or concerns from part time faculty whenever they need it throughout the year. Be a helper if they need someone to go with them to the Division Chair. Help orientate new faculty throughout the year. Be available in a mentoring role. Help part time faculty choose a representative to attend Division meetings as a voting member for part time faculty. This may happen 2-3 times a year depending on the representative's class scheduling. Note: The Mathematics Division utilizes the services of 42 to 45 part-time faculty each year.

**RESOURCES NEEDED:** \$3,932 for a 4-credit release backfill per year.

**FUNDING SOURCES:** Recurring General Fund

**INITIATIVE TITLE:** Breadth & Depth funds to look at text, ideology, etc.

**DESCRIPTION:** A team of full-time/part-time instructors will research the breadth and depth of offerings at other community colleges (inside and outside Oregon) and prepare a comparative report for the division.

**RESOURCES NEEDED:** \$983 for a 1-credit release backfill.

**FUNDING SOURCES:** Non-recurring General Fund and existing division funds

#### **INITIATIVE TITLE:** Math Enrichment Seminars (week before inservice)

**DESCRIPTION:** Full-time/part-time instructors will prepare presentations for the division of teaching/learning strategies that go beyond the basics of traditional teaching styles. A team of full-time/part-time instructors will survey the division to determine what specific topics would be of most interest.

**RESOURCES NEEDED:** \$983 for a 1-credit release backfill.

**FUNDING SOURCES:** Recurring General Fund and existing division funds

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH **202**.

**NOTE:** This is **one** of four classrooms requested to be done **'04/'05** (the other three are SCIE/MATH 206, 208, 210)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room 202:LCD Projector= \$3,000Installation Costs= \$1,500(per Dennis Mills)Totals= \$4,500

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH **206**.

**NOTE:** This is **one** of four classrooms requested to be done **'04/'05** (the other three are SCIE/MATH 202, 208, 210)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room **206**: LCD Projector = \$3,000 Installation Costs = <u>\$1,500</u> (per Dennis Mills) Totals = \$4,500

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH **208**.

**NOTE:** This is **one** of four classrooms requested to be done **'04/'05** (the other three are SCIE/MATH 202, 206, 210)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room 208: LCD Projector = \$3,000Installation Costs = \$1,500 (per Dennis Mills) Totals = \$4,500

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH **210**.

**NOTE:** This is **one** of four classrooms requested to be done **'04/'05** (the other three are SCIE/MATH 202, 206, 208)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room 210: LCD Projector = \$3,000Installation Costs = \$1,500 (per Dennis Mills) Totals = \$4,500

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH **213**.

**NOTE:** This is **one** of four classrooms requested to be done **'05/'06** (the other three are SCIE/MATH 219, 226, 257)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room 213: LCD Projector = \$3,000Installation Costs = \$1,500 (per Dennis Mills) Totals = \$4,500

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH **219**.

**NOTE:** This is **one** of four classrooms requested to be done **'05/'06** (the other three are SCIE/MATH 213, 226, 257)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room **219**: LCD Projector = \$3,000Installation Costs = \$1,500 (per Dennis Mills) Totals = \$4,500

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH **226**.

**NOTE:** This is **one** of four classrooms requested to be done **'05/'06** (the other three are SCIE/MATH 213, 219, 257)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room 226:LCD Projector= \$3,000Installation Costs= \$1,500(per Dennis Mills)Totals= \$4,500

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH **257**.

**NOTE:** This is **one** of four classrooms requested to be done **'05/'06** (the other three are SCIE/MATH 213, 219, 226)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room 257: LCD Projector = \$3,000 Installation Costs = <u>\$1,500</u> (per Dennis Mills) Totals = \$4,500

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH **271**.

**NOTE:** This is **one** of three classrooms requested to be done **'06/'07** (the other two are SCIE/MATH 184, 186)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room 271:LCD Projector= \$3,000Installation Costs= \$1,500(per Dennis Mills)Totals= \$4,500

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH 184.

**NOTE:** This is **one** of three classrooms requested to be done **'06/'07** (the other two are SCIE/MATH 186, 271)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room **184**: LCD Projector = \$3,000 Installation Costs = <u>\$1,500</u> (per Dennis Mills) Totals = \$4,500

**DESCRIPTION:** LCD Projector and installation for SCIE/MATH **186**.

**NOTE:** This is **one** of three classrooms requested to be done **'06/'07** (the other two are SCIE/MATH 184, 1271)

**RESOURCES NEEDED:** \$4,500

**FUNDING SOURCES:** TACT funds (non-recurring).

#### TACT Funds

Category of request:

Increase student access to technology.

- > How does this request fit in with other unit or college technology plans?
  - The Mathematics Division strives to develop an accessible learning environment for current and future students. We are systematically responding to change in technology by providing equipment in a timely fashion. We are minimizing barriers to learning by integrating appropriate technology into our courses. We *place students at the heart of what we do*, by having *current* equipment available for student learning, while minimizing the cost. We *mainstream innovation*, by replacing current equipment regularly and continually being open to new technology.

> Cost breakdown, including any unit resources being applied to project:

SCIE/MATH Room 186: LCD Projector = \$3,000 Installation Costs = <u>\$1,500</u> (per Dennis Mills) Totals = \$4,500

#### **INITIATIVE TITLE:** Share resources with college colleagues.

**DESCRIPTION:** Full-time/part-time instructors will prepare presentations of teaching/learning strategies that go beyond the basics of traditional teaching styles. A team of full-time/part-time instructors will survey the Division to determine what specific topics would be of most interest. In addition, resources and topics that may be of interest or impact the larger college community could be shared with other colleagues. Possible topics may include: exploring credit card interest rates, statistics manipulation, how to fully utilize the applications on your scientific/graphing calculators, and when should you retire and can you afford to.

**RESOURCES NEEDED:** Establish time, location, and communiqué.

**FUNDING SOURCES:** Recurring existing division funds

Division/Unit	Division Priority	Date of Initiative	Expected completion date	- Initiative Description	
		4/5/0004	C/40/0005	Mathematics Computer Lab	
	1	1/5/2004	6/13/2005	Equipment Replacement Plan	26 CI
	2	7/1/2004	6/13/05	Mathematics Instructor	1.0 F 2/5)
	3	1/4/2004	Ongoing	Mathematics/Engineering Instructor	1.0 F 2/5)
	4	6/14/2004	6/13/05	Developmental Algebra Study and Review	100 h
	5	6/14/2004	6/13/05	Study on structure, procedures, and pedagogy @ LCC & other colleges	100 h
	6	6/14/2004	9/17/2004	Develop and teach two week Sept. class (or 10 week, 1 cr.) for math anxious students	20 hr
					& 1 c
	7	9/17/2004	Ongoing	Part/Full-Time Mentoring	4 cre
	8	6/14/2004	6/13/05	Improve student retention	4 cre
	9	6/14/2004	9/17/2004	Design/establish dedicated share time	1 cre
	10	Current	Ongoing	Division business	three (one
	11	9/17/2004	Ongoing	MRC tutoring support (student retention)	Two Instru (1040
	12	9/1/2006	Ongoing	Computer lab support (Begin <b>9/01/06</b> when Siv's grant funded position ends)	1 FTE times
					OR T
	13	Current	Ongoing	Part-time faculty support	4 cre
	14	6/14/2004	9/17/04	Breadth & Depth funds to look at text, ideology, etc.	1 cre
	15	9/1/2004	Ongoing	Math Enrichment Seminars (week before inservice)	1 cre

16	7/1/2004	6/30/2005	Classroom delivery equipment	LCD Room
17	7/1/2004	6/30/2005	Classroom delivery equipment	LCD Room
18	7/1/2004	6/30/2005	Classroom delivery equipment	LCD Room
19	7/1/2004	6/30/2005	Classroom delivery equipment	LCD Room
20	7/1/2005	6/30/2006	Classroom delivery equipment	LCD Room
21	7/1/2005	6/30/2006	Classroom delivery equipment	LCD Room
22	7/1/2005	6/30/2006	Classroom delivery equipment	LCD Room
23	7/1/2005	6/30/2006	Classroom delivery equipment	LCD Room
24	7/1/2006	6/30/2007	Classroom delivery equipment	LCD Room
25	7/1/2006	6/30/2007	Classroom delivery equipment	LCD Room
26	7/1/2006	6/30/2007	Classroom delivery equipment	LCD Room
27	9/1/2004	Ongoing	Share resources with college colleagues	1 cre