Kingdom of Saudi Arabia
Ministry of Higher Education
Majmaah University
College Of Sciences
Mathematics Department

المملكة العربية السعودية
وزارة التعليم العالي
جامعة المجمعة
كلية العلوم
قسم الرياضيات

Teacher's Quality Manual

جامعة المجمعة
Majmaah University

2012- 1433

MATH ROAD MAP FOR PROGRAM ACCREDITATION

- After coming back from summer vacation; in the three weeks before the beginning of the first semester, several sessions will be held for all faculties to practice how to do course objectives, learning outcomes, level of learning, and mapping.

- Therefore, by the first week of the academic semester, MATH will have program vision, mission, objectives, and learning outcomes, as well as each course catalogue data including objectives and learning outcomes.

- During the first week of the semester, each MATH student will be handed a copy of the program vision, mission, objectives, and learning outcomes.

- Each faculty member will give each student a copy of the course catalogue he is teaching. A statement that the student receives such a copy will be signed by the student.

- The faculty will spend the first week explaining to the students the meaning of the program and course objectives and learning outcomes, the competencies and their level of learning, the different requirements to pass the specific course, and the procedure to implement and evaluate the outcomes. One or two seminars on accreditation and program continuous improvement will be given to the students to put them in the mode of Program Continuous Quality Improvement.

- Several committees will be formed to look at interrelated courses; regarding the contents, overlapping, credit hours, prerequisites, etc.

- The Department Quality Committee (DQC), through discussions with the different groups, will decide which course will cover which outcomes and in what level.

- The DQC with consultation with the academic groups will set up a map for implementing program objectives which may call for reduction of credit hours of some courses, or even eliminating one or two courses in order to introduce the Mathematics soft skills; this needs the support of all faculties.

- Each semester, starting the first semester 1431/1432, graduating seniors will be asked to respond to questionnaire (Graduating Senior Exit Survey).

- Student Advisory Committee will be performed from well spoken students. This committee will have meetings with the DQC in order to have informal feedback about the ME program.

- Each Fall, 1, 2 and 5 year out alumni will be identified and email (home or work address) lists will be created. Email (handout to home or work address) will be sent providing information and request to respond to questionnaire (Former Student Survey). 1 and 2 year out questionnaire includes questions on program outcomes.

- Request includes asking alumnus to ask supervisor to fill out questionnaire also (Employer Survey). Other way is to identify and prepare a list of the employers of our graduates and correspond with them directly.

- Questionnaires (Surveys) will be hosted on the internet.

- Responses obtained by semester's end are processed.

- Placement data will be obtained each semester.

- DQC will set up the assessment rubrics for each program outcome and each faculty member will get a copy of this assessment rubrics.

- DQC will set up the program assessment methods/metrics for each program outcome, followed by a seminar and open discussion for all faculty members.

- DQC will prepare "Course Assessment Form" that will be filled by the faculty. "Student Sign Off Form for ME Course" will also be prepared.

- Early Spring Semester, DQC receives data and reviews and sorts information. DQC is responsible for directing the data to the appropriate place, such as curriculum committee, academic groups, etc., and obtaining a written response on any action taken in response to the data.

- Any action to be taken should be known by the end of spring semester and should be in place by beginning of the next fall.

- This cycle will produce a time history which should show improvements in the program over time. After several cycles pass, this result can be demonstrated graphically.

- Additionally, individual course data will also be processed at the same time and DQC will process that data each Fall semester from the previous year. DQC will forward that data to the appropriate faculty member in charge.

- By the end of Fall 1432/1433, Self-Study Report will be written.

Assessment Glossary

***Assessment Criteria*:** Stated levels of performance for each assessment method that will be used to guide decisions and set priorities for improvement.

***Assessment Method*:** An instrument or other type of data collection technique designed to elicit evidence to measure an outcome indicator or series of outcome indicators. Portfolios, alumni surveys, peer surveys, employer surveys, rubrics, faculty rating forms, course evaluations, focus groups, pre- and posttests, senior design projects, placement data, self-assessments, documented subjective evidence, exit interviews, classroom assessment techniques, etc. are examples of assessment methods.

***Audit*:** An independent review and evaluation of the outcomes of the quality assurance processes an institution or part of an institution, or a form of a program.

***Benchmarks*:** Points of comparison or levels of performance used for establishing objectives and assessing performance. Benchmarks may be current levels of performance at an institution, standards established by an external agency, or standards of performance at another institution or group of institutions selected for comparison.

***Course*:** A systematic program of study normally over a period of one semester or calendar year and designed to develop specified learning outcomes as part of a program.
***Course Specification*:** A detailed description of a course including the topics or units of work to be studied, the intended learning outcomes and the methodology and resources used to develop those outcomes including details of staffing text and reference material, and requirements for resources and equipment. A course specification includes methods of student assessment and course evaluation including indicators and benchmarks to be used.

***Course Portfolio*:** A collection of documents and notes describing the development, conduct, evaluation and changes in a course. A course portfolio is and ongoing record of what happens in a course and how it is developed and modified over time as a result of feedback during delivery, changing circumstances, and reviews of effectiveness. It should include original specification and amendments to those specifications, data on indicators including results of evaluations of teaching effectiveness and indicators and achievement of benchmarks relating to learning outcomes. A portfolio should include copies of annual course reports, and summary information about any significant events affecting the conduct or effectiveness of the course. Information contained in course portfolios serves as a primary source of information in the periodic (normally five-six yearly) self-study reports and external reviews for program accreditation.

***Course Reports*:** Reports prepared on the effectiveness of a course including data on indicators and interpretations of evidence on the achievement of learning outcomes, and changes planned in response to that evidence and changing circumstances. Course reports are normally prepared by an instructor each time a course is offered for consideration by program coordinators subsequent course instructors. Copies of Course reports should be

included in course portfolios, and form an important part of the information considered in periodic self-studies and external reviews.

***Goal*:** A statement outlining the broad ideas of the program. The University and College goal statements are examples of goals. Goals show where you want to go. There should only be a few of these because they are your major program goals. For example, you might think of these key words when writing your goal statements: theory/knowledge (of engineering principles), practice/application (of engineering principles), awareness (of role in society), and communication (of engineering principles; interpersonal).

***Indicator*:** Measurable examples of an outcome either through observation, self-report, or score. Think of these as a rubric to tell you if your outcomes were achieved. You might wish to develop phrases that could be answered with "yes" or "no." An item on an instrument would be an example of an outcome indicator. Indicators should be as specific as directly related as possible to the aims and objectives to which they relate. However direct measures of some of the most important objectives such as quality of students learning are sometimes difficult to find. Consequently indirect evidence such as student evaluations of programs, employment outcomes, and employer surveys must sometimes be used. Since indirect indicators can be subject to other influences it is usual to use several different but related indicators for important objectives, and to interpret these using some independent system to verify the interpretation.

***Internal Quality Assurance*:** Processes of quality assurance carried out within and by or for a higher education institution. It includes not only the processes of monitoring and review that an institution manages itself, but also its use of outside people from other institutions, from industry or the professions, or from other accreditation or quality assurance agencies to review and provide advice on its programs and activities. Internal quality assurance is normally comprehensive, dealing with inputs, processes and outcomes, with all areas of an institution's activities, and with staff and students in all parts of the institution.

***Learning Outcome*:** A statement derived from an objective that describes what specific result will occur if the objectives are met. Typically, outcomes are student related and state what knowledge and skills are to be acquired and demonstrated by each student by the end of the department's program.

***Level*:** The intellectual standard and complexity of learning expected as students progress through a program of study. The degree of difficulty or complexity of learning increases as students advance through a program and these increases are defined by descriptions of the learning outcomes that are expected.

***Major Change in Program*:** A change that significantly affects the learning outcomes, structure, organization or delivery of a program or the basis for its accreditation.

***Mission*:** A brief general statement setting out the principal policy objectives for the development of an institution or a program. While stated in general terms a mission statement should be sufficiently precise to serve as a guide to planning and decision making at all levels of the organization, and should actually be used as a basis for decision making.

***Objective*:** A statement derived from a goal that is a more specific application of that goal and explains what will occur in terms of knowledge, skills, or abilities if an objective is met. An objective is a statement of how a department is to support the institutional, college and program missions. Objectives are maps of how you are going to get where you want to go.

***Outputs*:** The product of an institution's activities, normally expressed in quantitative terms. Outputs usually refer to quantitative measures of what is produced by an institution, such as the number of graduates or the number of staff research publications.

***Practice*:** An activity that may be a part of a student's educational experience and provides opportunities to learn.

Peer Review: External evaluation and report on a program, institution or part of an institution by expert evaluators from similar institutions or professions who are specialists in the field concerned or with higher education generally.

***Processes*:** The administrative arrangements, policies, and organizational procedures carried out by an institution in planning, reviewing and delivering its programs. Processes are what is done in an institution to use the inputs available to it to produce its outputs and outcomes. The term includes teaching processes, assessment procedures, and processes for managing research and community activities as well as a wide range of other activities that have direct or indirect impact on educational programs.

***Program*:** A coherent program of study followed by students in an academic field or leading to a professional qualification, the successful completion of which qualifies them for an academic award. A program may include electives or different strands, and may include some courses that also taught in other programs. However to be organized as a program it must be made up of a coordinated group of courses designed to develop a single set of related learning outcomes, and lead to an academic award.

***Program Specification*:** A detailed description of a program including its intended learning outcomes and the methodology and resources used to develop those outcomes. A program specification includes summary descriptions of required and elective courses, methods of student assessment and program evaluation, and the staffing, resources and equipment required. In professional program the program specification should include descriptions of the processes to be used to ensure the continuing relevance of components of the program to the field concerned. Mechanisms should be included in all programs to

ensure that the elements of the program remain up to date with the latest research and other developments in the field.

***Program Portfolio*:** A collection of documents and notes describing the development, conduct, evaluation and changes in a program. A program portfolio is and ongoing record of what happens in a program and how it is developed and modified over time as a result of changing circumstances and reviews of effectiveness,. It should include original program specifications and amendments in specifications, data on indicators including summaries for each evaluations of teaching effectiveness and indicators and achievement of benchmarks relating to learning outcomes. A portfolio should include copies of annual (or other) program reports, and summary information about any significant events affecting the conduct or effectiveness of the program. Information obtained in program portfolio serves as a primary information in the preparation of periodic (normally five-six yearly) self-study reports and external reviews for program re-accreditation.

***Program Reports*:** Reports prepared on the effectiveness of a program including data on indicators and interpretation of evidence on the achievement of learning outcomes, and changes planned in response to that evidence and changing circumstances. Program reports are normally prepared annually for consideration by those planning and teaching in a program, and by the department, college or institution. Copies of program reports should be included in program portfolios, and form an important part of the information considered in periodic self-studies and external reviews.

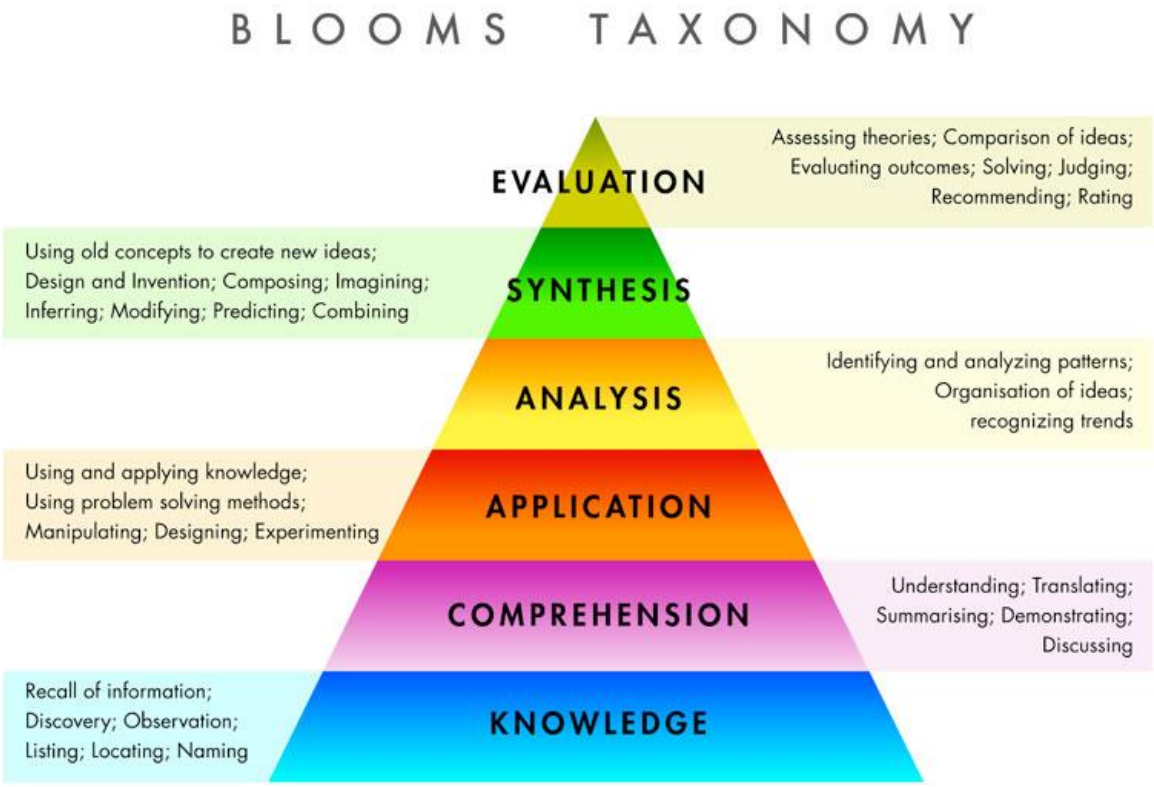
***Quality Assurance*:** Processes of assessment, evaluation and follow up relating to quality of performance, which serve two distinct purposes. To: (a) Ensure that desired levels of quality are maintained and improved, and (b) Assure stakeholders that quality is being maintained at levels comparable to good practice in highly regarded institutions elsewhere in the world. Stakeholders in this context include students, the Government and the wider community, including parents, professional associations and industry.

***Substantial Equivalence*:** A judgment that a unit, subject or other component of a program is equal in quality and equivalent in scope to one offered elsewhere.

***Student Attributes*:** Special characteristics of students developed as a result of the particular policies and teaching strategies of an institution. The development of particular student attributes is often an important part of the mission of an institution. For example, an institution may adopt procedures to ensure students are particularly self-reliant, more creative and entrepreneurial, or more effective than would normally be the case in group situations. The term is normally reserved for attitudes, skills, and habits of behavior or personality characteristics that are exhibited in students' behavior in outside situations rather than for purely academic learning outcomes which may refer to abilities rather than actual behavior.

Bloom's Definition

The cognitive domain involves knowledge and the development of intellectual skills (Bloom, 1956). This includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of intellectual abilities and skills. There are six major categories, which are listed in order below, starting from the simplest behavior to the most complex. The categories can be thought of as degrees of difficulties. That is, the first ones must normally be mastered before the next ones can take place.



***Analysis*:** Breaking down objects or ideas into simpler parts and seeing how the parts relate and are organized.
Verbs: Analyze, appraise, breakdown, calculate, categorize, compare, contrast, criticize, diagram, differentiate, discriminate, distinguish, examine, experiment, identify, illustrate, infer, model, outline, point out, question, relate, select, separate, subdivide, test.

***Application*:** Applying knowledge to actual situations.
Verbs: Apply, change, choose, compute, demonstrate, discover, dramatize, employ, illustrate, interpret, manipulate, modify, operate, practice, predict, prepare, produce, relate schedule, show, sketch, solve, use, write.

***Comprehension*:** Grasping the meaning of information.
Verbs: Classify, convert, defend, describe, discuss, distinguish, estimate, explain, express, extend, generalized, give example(s), identify, indicate, infer, locate, paraphrase, predict, recognize, rewrite, report, restate, review, select, summarize, and translate.

***Evaluation*:** Making judgments based on internal evidence or external criteria.
Verbs: Appraise, argue, assess, attach, choose, compare, conclude, contrast, defend, describe, discriminate, estimate, evaluate, explain, judge, justify, interpret, relate, predict, rate, select, summarize, support, value.

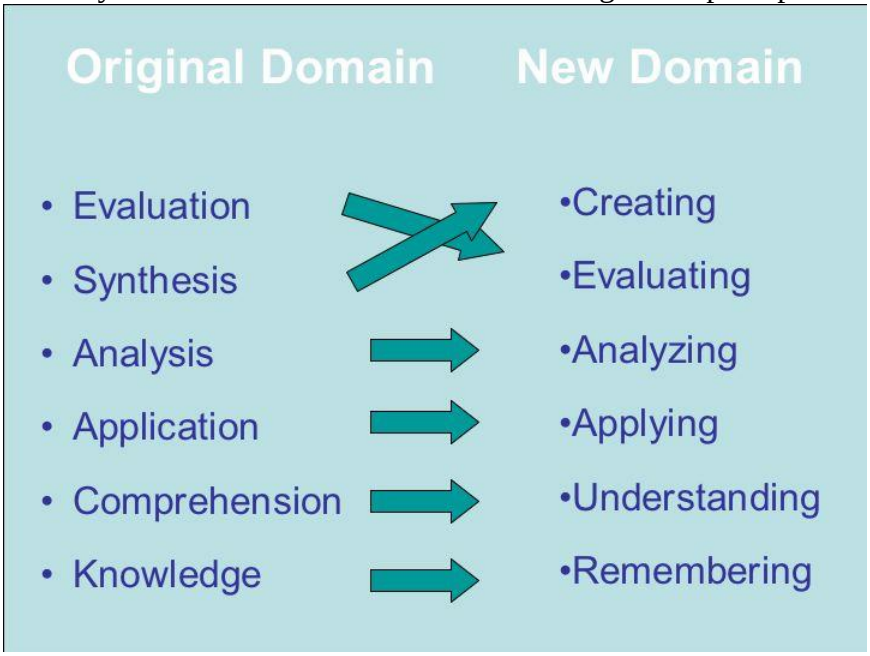
***Knowledge*:** Remembering previously learned information.
Verbs: Arrange, define, describe, duplicate, identify, label, list, match, memorize, name, order, outline, recognize, relate, recall, repeat, reproduce, select, state.

***Synthesis*:** Rearranging component ideas into a new whole.
Verbs: Arrange, assemble, categorize, collect, combine, comply, compose, construct, create, design, develop, devise, explain, formulate, generate, plan, prepare, propose, rearrange, reconstruct, relate, reorganize, revise, rewrite, set up, summarize, synthesize, tell, write.

***Valuation*:** Sensitivity/willingness to receive (awareness w/o assessment, willingness to suspend judgment); actively respond (comply, commit, internal satisfaction); Value (acceptance of worth, preference); Organize (when values conflict)
Verbs: Accept, challenge, defend, respect, question, support, enjoy.

Bloom's Revised Taxonomy

Lorin Anderson, a former student of Bloom, revisited the cognitive domain in the learning taxonomy in the mid-nineties and made some changes, with perhaps the two most prominent ones being, 1) changing the names in the six categories from noun to verb forms, and 2) slightly rearranging them (Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, Raths, Wittrock, 2000; Pohl, 2000).
This new taxonomy reflects a more active form of thinking and is perhaps more accurate:



- See more at:
http://www.nwlink.com/~donclark/hrd/bloom.html#sthash.GKIQOfOH.dpuf

Table of the Revised Cognitive Domain

Category	Example and Key Words (verbs)
Remembering: Recall previous learned information.	**Examples**: Recite a policy. Quote prices from memory to a customer. Knows the safety rules. **Key Words**: defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, selects, states.
Understanding: Comprehending the meaning, translation, interpolation, and interpretation of instructions and problems. State a problem in one's own words.	**Examples**: Rewrites the principles of test writing. Explain in one's own words the steps for performing a complex task. Translates an equation into a computer spreadsheet. **Key Words**: comprehends, converts, defends, distinguishes, estimates, explains, extends, generalizes, gives an example, infers, interprets, paraphrases, predicts, rewrites, summarizes, translates.
Applying: Use a concept in a new situation or unprompted use of an abstraction. Applies what was learned in the classroom into novel situations in the work place.	**Examples**: Use a manual to calculate an employee's vacation time. Apply laws of statistics to evaluate the reliability of a written test. **Key Words**: applies, changes, computes, constructs, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses.
Analyzing: Separates material or concepts into component parts so that its organizational structure may be understood. Distinguishes between facts and inferences.	**Examples**: Troubleshoot a piece of equipment by using logical deduction. Recognize logical fallacies in reasoning. Gathers information from a department and selects the required tasks

	for training. **Key Words**: analyzes, breaks down, compares, contrasts, diagrams, deconstructs, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates.
Evaluating: Make judgments about the value of ideas or materials.	**Examples**: Select the most effective solution. Hire the most qualified candidate. Explain and justify a new budget. **Key Words**: appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports.
Creating: Builds a structure or pattern from diverse elements. Put parts together to form a whole, with emphasis on creating a new meaning or structure.	**Examples**: Write a company operations or process manual. Design a machine to perform a specific task. Integrates training from several sources to solve a problem. Revises and process to improve the outcome. **Key Words**: categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes.

Activities at Various Cognitive Levels of Learning (LoL)

Bloom's taxonomy of learning objectives is used to define how well a skill or competency is learned or mastered. A fuller description of Bloom's taxonomy is given in the following pages but a brief summary of the activities associated with each level is given below.

1. At **Knowledge** Level of Learning, a student can define terms

2. At **Comprehension** Level of Learning, a student can work assigned problems and can give examples of what they did
3. At **Application** Level of Learning, a student recognizes what methods to use and then uses the methods to solve the faced problems
4. At **Analysis** Level of Learning, a student can explain why the solution process works
5. At **Synthesis** Level of Learning, a student can combine the part of a process in new and useful ways
6. At **Evaluation** Level of Learning, a student can create a variety of ways to solve the problem and then, based on established criteria, select the solution method best suited for the problem.

KNOWLEDGE (INFORMATION)

1. How do **I know** I have reached this level?

   I can recall information about the *subject, topic, competency,* or *competency area*; I can *recall* the appropriate material at the appropriate time. I have been *exposed* to and have *received* the information about the subject; thus, I can respond to questions, perform relevant tasks, etc.

2. What do **I do** at this level?

   I read material, listen to lectures, watch videos, take notes; I pass 'True/False', 'Yes/No', 'multiple choice', or 'fill in the blank' tests which demonstrate my *general knowledge* of the *subject*. I learn the vocabulary or terminology as well as the conventions or rules associated with the *subject*.

3. How will the **teacher know** I am at this level?

   The teacher will provide *verbal* or *written* tests on the *subject* that can be answered by simply *recalling* the material I have learned about this subject.

4. What does the **teacher do** at this level?

   The teacher directs, tells, shows, identifies, and examines the subject or competency area *at this level*.

5. What are typical ways **I** can demonstrate my knowledge?
   a. Answer 'True/False', 'Yes/No', 'fill in the blank', or 'multiple choice' questions correctly.

b. Define technical terms associated with the subject by stating their attributes, properties, or relations.
c. Recall the major facts about the subject.
d. Name the classes, sets, divisions, or arrangements that are fundamental to the subject.
e. List the criteria used to evaluate facts, data, principles, or ideas associated with the subject.
f. List the relevant principles and generalizations associated with the subject.
g. List the characteristic methods of approaching and presenting ideas associated with the subject (e.g., list the conventions or rules associated with the subject).
h. Describe the general problem solving method (i.e., the techniques and procedures) or the method(s) of inquiry commonly used in the subject area.

6. What are typical ***work products***?
   a. Answers to Knowledge level quizzes ('True/False', 'Yes/No', 'fill in the blank', or 'multiple choice').
   b. Lists of definitions or relevant principles and generalizations associated with the subject.
   c. Modifications of example problems presented in the textbook; for example, modest changes in numerical values or units; i.e., solutions to problems which were solved using 'pattern recognition'.
7. What are descriptive **'process' verbs**?

define	label	listen	list	memorize	name
read	recall	record	relate	repeat	view

COMPREHENSION (UNDERSTANDING)

1. How do **I know** I have reached this level?

   I comprehend or understand the *subject, topic, competency,* or *competency area;* I use ideas associated with the subject without relating them to other ideas or subjects. I may not yet completely understand the subject. When others are discussing this subject, I can follow and understand the discussion. This level requires **Knowledge**.

2. What do **I do** at this level?

   I successfully solve textbook problems using appropriate techniques and procedures based on (**1**) where the problem is located in the book or (**2**) the problem statement. I translate ideas into my own words (translation from one level of abstraction to another). I translate graphical or symbolic information (e.g., tables, diagrams, graphs, mathematical formulas, etc.) into verbal forms, and vice

versa. I interpret or summarize communications (oral/written/graphical). I can use the problem solution to determine effects, trends, implications, corollaries, etc.

3. How will the **teacher know** I am at this level?

   The teacher will ask questions that can be answered by restating or reorganizing material in a literal manner; i.e., by clearly stating facts or the principle meaning of the material in your own words. The teacher will also give tests based on the textbook problems that were (**1**) assigned as homework **or** (**2**) used as examples in the textbook or in class.

4. What does the **teacher do** at this level?

   The teacher demonstrates, solves problems, listens, questions, compares, contrasts, and examines the information and your knowledge of the subject.

5. What are typical ways **I** can demonstrate, on my own, my comprehension and understanding?
   a. Read textbook problems, understand what is required, and successfully solve the problems.
   b. Clearly document the process used to solve the problem.
   c. Clearly describe the solution to the problem.
   d. Draw conclusions based on the solution to the problem.
   e. Compare/contrast two different textbook problems (i.e., what elements are the same? what elements are different?).
   f. Restate an idea, theory, or principle in your own words.
6. What are typical **work products**?
   a. Answers to Comprehension level quizzes and exams (‘multiple choice’ or textbook problems).
   b. Solutions to textbook problems which include (a) a summary of the learning objectives associated with the problem, (b) the problem statement in the form of a clearly labeled sketch, specifications, and what is required, (c) a description of the general solution method (techniques and procedures) used to solve the problem, and (d) a discussion of the solution.
7. What are descriptive **‘process’ verbs**?

describe	discuss	explain	express	identify	locate
recognize	report	restate	review	solve	tell

APPLICATION (INDEPENDENT PROBLEM SOLVING)

1. How do I know I have reached this level?

I can recognize the need to use an idea, concept, principle, theory, or general solution methods (techniques and procedures) **without being told** and **without any specific or immediate context or cues.** For example, I do not need to locate a similar example in a textbook, nor do I need to know that an assignment is for a particular course in order to recognize the need to use a particular idea, etc. I know and comprehend these ideas, concepts, principles, theories, or general solution methods (techniques and procedures and I can apply them to new situations. I also have the ability to recognize when a certain task or project is beyond my current competency. This level requires **Knowledge** and **Comprehension**.

2. What do I do at this level?

   I apply ideas, concepts, principles, theories, or general solution methods (techniques and procedures) that I learned at the Knowledge and Comprehension level to new situations. I solve problems in which the solution method is not immediately evident or obvious. I solve these problems independently and make use of other techniques and procedures as well. This requires not only knowing and comprehending these ideas, concepts, principles, theories, and general solution methods (techniques and procedures) but deep thinking about their usefulness and how they can be used to solve new problems that I identify or define.

3. How will the teacher know I am at this level?

   The teacher will review my work products and confirm that I am solving problems independently, in new situations, and without prompting by the teacher. The teacher will be able to pose general questions such as *"How much protection from the sun is enough?"* and I will know how to answer the question by defining and solving a problem.

4. What does the **teacher do** at this level?

   The teacher assigns problems that do not explicitly (or as best possible implicitly) imply the use of an expected solution methodology. The teacher may develop problems and assignments in conjunction with teachers in another related subject areas. The teacher will probe for use of course material outside of the course.

5. What are the typical ways **I** can demonstrate, on my own, my Application of Knowledge and Comprehension?
   a. Solve problems which require that I recognize and apply the appropriate ideas, concepts, principles, theories, general solution methods (techniques and procedures), etc. without being told and without any specific or immediate context or cues.

b. Apply the laws of mathematics, chemistry, and physics, as well as engineering, business or design concepts, etc. to practical problems or situations.
c. Solve problems associated with design/build projects.

6. What are typical ***work products***?

   Application level work products are very similar to Comprehension level work products; however, documentation will be included which demonstrates that you recognized the need to use ideas, concepts, principles, theories, general solution methods (techniques and procedures), etc. in a new situation.

7. What are descriptive **'process' verbs**?

apply	demonstrate	employ	illustrate	interpret
operate	practice	recognize	solve	use

ANALYSIS (LOGICAL ORDER, COMPONENTS)

1. How do I know I have reached this level?

   I can explain why. I can methodically examine ideas, concepts, principles, theories, general solution methods (techniques and procedures), reports, etc. and separate these into their component parts or basic elements. I can use the results of this examination to clarify the organization of the whole or to gain a global view. This level requires Knowledge and Comprehension Levels of Learning; Application is not required.

2. What do I do at this level?

   I demonstrate that I can analyze results by breaking ideas, concepts, principles, theories, general solution methods (techniques and procedures), reports, etc. into their component parts. I explain the logical interconnections of the parts. I can also develop detailed cause and effect sequences.

3. How will the teacher know I am at this level?

   When asked, I am able to explain why I did what I did. I include a discussion with my work that explains why my solution method worked.

4. What does the teacher do at this level?

   The teacher probes, guides, observe, and acts as a resource or facilitator.

5. What are typical questions I can ask myself that will demonstrate my Analysis Level of Learning?
    a. What are the causal relationships between the parts and how the whole functions?
    b. Can I explain, from the parts, why the whole does or does not work?
    c. Are the conclusions supported by sound reasoning?
    d. Does the evidence provided support the hypothesis or the conclusion?
    e. Are the conclusions supported by facts, opinions, or an analysis of the results?
    f. What are the unstated assumptions, if any?
6. What are typical work products?
    a. Answers to Analysis level exams (problems, multiple choice, and essays).
    b. Analysis level work products are very similar to Comprehension level work products; however, documentation will include a more extensive discussion of the work. The content, amount, and depth of the presentation is what distinguishes Analysis level work products from Comprehension level work products; e.g., see items a. through f. above.
7. What are descriptive 'process' verbs?

analyze	appraise	break apart	break down	calculate
compare	contrast	debate	diagram	differentiate
examine	experiment	explain	inspect	inventory
question	relate	solve		

SYNTHESIS (CREATE)

1. How do I know I have reached this level?

   I have the ability to assemble parts and elements into a unified organization or whole that requires original or creative thinking. I recognize new problems and develop new tools to solve them. I create my own plans, models, hypotheses, etc. for constructing solutions to problems. This Level of Learning requires Knowledge, Comprehension, Application and Analysis Levels of Learning.

2. What do I do at this level?

   I generate ideas and use them to create a physical object, a process, a design method, a written or oral communication, or even a set of abstract relations (e.g., mathematical models). I produce written or oral reports that have the desired effect (e.g., information acquisition, acceptance of a point of view, continued support, etc.) on the reader or listener. I generate project plans. I propose designs. I formulate hypotheses based on the analysis of relevant or pertinent factors. I am able to generalize from a set of axioms or principles.

3. How will the teacher know I am at this level?

   I demonstrate that I can combine ideas into a statement, a plan, a product, etc. that was previously unknown to me; e.g., I develop a program that includes the best parts of each of these ideas.

4. What does the teacher do as this level?

   The teacher reflects, extends, analyzes, and evaluates.

5. What are the typical questions I can ask myself that will demonstrate my Synthesis Level of Learning?
   a. Can I create a project plan?
   b. Can I develop a model?
   c. Can I propose a design?
6. What are typical work products?
   a. Answers to Synthesis level exams (problems, multiple choice, and essays).
   b. Synthesis level work products are very similar to Comprehension level work products; however, documentation will include a more extensive discussion of the work. The content, amount, and depth of the presentation is what distinguishes Synthesis level work products from Comprehension level work products; e.g., see items a. through c. above.
7. What are descriptive 'process' verbs?

Arrange	assemble	collect	compose	construct
create	design	formulate	manage	organize
plan	prepare	propose	set up	write

EVALUATION (APPRECIATION)

1. How do I know I have reached this level?

   I have the ability to judge and appreciate the value of ideas, concepts, principles, theories, or general solution methods (techniques and procedures) using appropriate criteria. This level requires Knowledge, Comprehension, Application, Analysis, and Synthesis Levels of Learning.

2. What do I do at this level?

   I make value judgments based on certain criteria such as usefulness and effectiveness. Based on information gained through application, analysis, and synthesis, I can rationally select a process, a method, a model, a design, etc. from among a set of possible processes, methods, models, designs, etc. I evaluate competing plans of action before actually starting the work. I evaluate work

products based on internal standards of consistency, logical accuracy, and the absence of internal flaws; e.g., I can certify that the feasibility of a design has been demonstrated in a report. I evaluate work products based on external standards of efficiency, cost, or utility to meet particular goals or objectives; e.g., I can certify that the quality of the design has been demonstrated in a report.

3. How will the teacher know I am at this level?

   I demonstrate that I can select, judge, or appreciate a process, a method, a model, a design, etc. using appropriate criteria or standards.

4. What does the teacher do at this level?

   The teacher clarifies, accepts, harmonizes, aligns, and guides.

5. What are typical statements and questions I can answer to that will demonstrate or show my appreciation/evaluation?
   a. I can evaluate an idea in terms of ...
   b. For what reasons do I favor...?
   c. Which policy do I think would result in the greatest good for the greatest number?
   d. Which of these models or modeling approaches is best for my current needs?
   e. How does this report demonstrate that the design is feasible?
   f. How does this report demonstrate the quality of the design?
6. What are typical work products?
   a. Answers to Evaluation level exams (problems, multiple choice, and essays).
   b. Evaluation level work products are very similar to Comprehension level work products; however, documentation will include a more extensive discussion of the work. The content, amount, and depth of the presentation is what distinguishes Evaluation level work products from Comprehension level work products; e.g., see items a through f above.
7. What are descriptive ‘process’ verbs?

appraise	assess	choose	compare	estimate (quality)
evaluate	judge	predict (quality)	rate value	select

Practices to Achieve Desired Outcomes

The primary means by which students achieve the desired outcomes is through the curriculum, in which specific technical skills are learned in classes and laboratories, and then applied through other courses and projects.

- Several Tables will be constructed to show all engineering courses required for the degree in Mathematics and their contributions toward achieving the Program Outcomes. While some outcomes achieved in a course are assessed in the course (through graded assignments, for example), others simply provide students in the course with an exposure.
- The contribution of the required non-engineering courses to achieving the Program Outcomes will also be demonstrated.
- It should be noted that students are continuously provided the opportunity throughout their academic career to demonstrate achievement of the Program Outcomes. Repetitive achievement of specific outcomes throughout a student's academic career demonstrates that students are reaching a higher level of achievement for the outcome.

Assessment Methods

Assessment methods are methods of gathering evidence to demonstrate that those outcomes important to the missions and objectives are being measured, i.e., outcomes indicators. The following items outline the methods used to collect evidence of desired outcomes as suggested by NCAAA as well as those selected by this department.

Some program outcomes can be measured using "devices" administered by the department, while others depend on external assessment. In addition, some program outcomes can be assessed using direct measures while others will probably have to be inferred by observing student behavior or by indirect measures such as student self-reporting.

The assessment methods listed below were selected by this department. A description of each method's process is outlined on the following pages.

i. Senior projects
ii. Portfolios or specific course assignments
iii. Alumni surveys
iv. Employer/recruiter surveys
v. Placement data
vi. Student exit interviews
vii. Course evaluations
viii. Participation in professional society
ix. Summer training

Instructor's guide to Course Assessment Report and Plan for Improvement

Course Assessment Plan:
Each individual instructor must prepare a course assessment plan at the beginning of the semester in which the course is being offered. The plan must clearly define how the instructor will assess whether this particular offering has achieved the outcomes on the syllabus.

The assessment procedures must clearly define how each of the syllabus outcomes will be directly monitored. Direct monitoring of the achievement of outcomes is preferred. Direct methods involve graded work, such as homework, exams, lab exercises, lab reports, and projects. Student surveys are indirect assessment tools and carry less weight in proving that outcomes have been achieved. However, surveys are useful in gauging how the course was organized from the standpoint of our students, and can lead to suggestions for future improvements or refocus.

The instructor is free to define whatever assessment and improvement procedures he deems appropriate, but they must rely mostly on direct measures, and they must cover all of the course outcomes. Once written, however, the instructor has obligated himself to follow that plan in preparing the final course assessment.

Course Assessment Report and Plan for Improvement

Each individual instructor must prepare a course assessment and a plan for improvement at the end of the semester. This is a report that uses the outcome monitoring methods defined in the assessment plan to determine how well the course outcomes have been achieved. If deficiencies have been noted, then it also includes a plan for improving the course in the future in order to remedy these deficiencies.

The assessment and the plan for improvement are to be written by the instructor. It is necessary to develop some sort of semi-quantitative rating of how well each outcome has been achieved. It is also necessary to document which direct and indirect evidence has been used by the instructor in order to assess each outcome. It is not appropriate to include "raw data" in this section. Examples of inappropriate raw data include grade statistics for homework assignments, for exams, or for the students' cumulative course averages. Such data do not constitute an assessment even if a mapping has been made between particular graded work and course outcomes. It is the instructor's duty to interpret such raw data and to come to an overall assessment of how well each outcome has been achieved.

The instructor may want to include an additional improvement plan that is not in response to a failure to achieve outcomes. Such improvements will normally be motivated by the instructor's own vision of how the course can be made more relevant or more up-to-date.

Portfolio or Specific Course Assignments

Course portfolios are to be compiled for each course taught in the ME program in the '1431-1432 H' ('20011- 20012') academic year. Each portfolio contains representative (**good, satisfactory, poor or the equivalent superior, acceptable, unacceptable**) samples of homework, quizzes, tests, laboratory assignments and reports, as applicable for each course. In addition, some project hardware (prototypes) may also be available. Choose to use permission slips or white out student names.

While the portfolios are not used for assessment purposes, they will be available for inspection by the NCAAA evaluator. In certain instances, specific assignments (e.g. design projects, senior projects and reports) are used for assessment purposes.

Coordinator's Responsibilities: The professor for each course is responsible for collecting and compiling the sample coursework.

Please prepare Course Binder according to the following.

NCAAA Course Binders
General Information

1. NCAAA Syllabus
[2-3 page document in NCAAA format].

2. Outcomes
[Include level of coverage (L/M/H) and location of relevant material in course binder - Course Classification Form (with Examples).]

3. Course Information
[Instructor syllabus, grading policy, and any other similar material]

4. Class Handouts
Handouts not related directly to student assignments/work, i.e., information provided to supplement the text, but not an assignment that would be covered under a later heading. Could also include instructors lecture notes if they weren't too voluminous - or, these could go under heading number 10 if the instructor so desired.

5. Homework
HW assignments, etc; and examples of student work.

6. Written Reports and Other Student Assignments
Report assignments, etc; and examples of student work.

7. Lab Assignments
Lab assignments, etc; and examples of student work.

8. Exams

Include quizzes, tests, mid-terms, final exams, etc., and examples of student work.

9. Student Roster

Grade roster (list) with names blanked out unless permission slips are used.

10. Other

An annex-like location for anything the instructor wants to include other than what goes under the previous headings?

VISION, MISSION, OBJECTIVES, AND OUTCOMES for Mathematics Prog.

Vision, Mission, Goals and Outcomes

i. Vision

Developing communication skills, computational skills, critical thinking, problem solving and research skills. The theory, discipline, and techniques taught in mathematics courses are especially essential in today's society.

ii. Mission

Providing graduates with skills to be able to communicate with outside Society and contribute to this society; obtaining information to critically assess numerical and graphical solutions; learning to formulate strategies for solving problems; acknowledging the importance of being intellectually curious throughout their long lives, pursuing their postgraduate interests, including graduate study, teaching, and private or government employment.

iii. Program Learning Goals and Objectives

Learning Goal 1*:* Mathematics majors will develop computational skills in first-year calculus needed for more advanced calculus-based courses.

Objectives: Students will:

a. evaluate derivatives for complexly constructed elementary functions;
b. evaluate definite and indefinite integrals; and
c. evaluate limits using algebraic, geometric, analytic techniques.

Learning Goal 2*:* Mathematics majors will learn and retain basic knowledge in the core branches of mathematics.

Objectives*:* Students will, during their senior year:

a. demonstrate proficiency in calculus;
b. demonstrate proficiency in linear algebra; and
c. Demonstrate proficiency in algebra.

Learning Goal 3*:* Mathematics majors will be able to learn and explain mathematics on their own.

Objectives*:* Students will:

a. read a mathematics journal article and explain it, orally or in writing, to an audience of math majors and
b. After graduation, be able to master new mathematics necessary for their employment.

Learning Goal 4: Mathematics majors will be able to read and construct rigorous proofs.

Objectives*:* Students will:

a. construct clearly written proofs which use correct terminology and cite previous theorems;
b. construct proofs using mathematical induction;
c. construct proofs by contradiction; and
d. Judge whether a proof is sound, and identify errors in a faulty proof.

Learning Goal 5: Mathematics majors will be able to obtain employment in their area of mathematical interest or gain admittance to a graduate program in mathematics.

Objectives: Students who:

a. seek admission to graduate schools in mathematics will succeed in gaining admission, and perform adequately in these programs;
b. seek entry-level employment in math-related fields will obtain it;
c. specialize in actuarial science will obtain entry-level work as actuaries, if they seek it;
d. specialize in secondary education will demonstrate proficiency in mathematics needed to obtain Initial Certification in New York State; or
e. Seek jobs in secondary or elementary education will obtain jobs at the appropriate grade level.

Learning Goal 6: Master's students will recognize connections between different branches of mathematics.

Objectives: Students will:

a. correctly incorporate specific examples from one branch of mathematics into their study of another branch of mathematics (e.g., Lp-spaces as an example in linear algebra) and

b. Identify and explain cases in which major results of one branch of mathematics rely nontrivially on results from another branch (e.g., the application of linear algebra to solving systems of differential equations).

Learning Goal 7*:* Graduating master's degree students will be able to obtain employment in their area of mathematical interest or gain admittance to a doctoral program in mathematics.

Objectives: Students who:

a. seek admission to doctoral programs in mathematics, applied mathematics, mathematical finance, mathematics education or other math-related fields will succeed in gaining admission to such programs, and perform adequately in these programs;

b. seek employment as full-time instructors at community colleges or as part-time instructors at four-year colleges or universities will obtain it; and

c. Seek employment in other math-related fields will obtain it.

NCAAA Outcomes

Knowledge

Graduate have ability to recall, understand, and present information, including:
 Knowledge of facts
 Knowledge of concepts, principles and theories, and
 Knowledge of procedures

The levels of knowledge expected of Bachelor's Degree graduates
Successful graduates should demonstrate:

 A comprehensive, coherent and systematic body of knowledge in their field and the underlying principles and theories associated with it.
 An awareness of relevant knowledge and theory in other related disciplines and professional fields.
 Familiarity with the latest developments at the forefront of specializations within their field including current research resolution of significant professional issues.
 An awareness of relevant conventions, regulations, and technical requirements and of how these

Cognitive Skills

Cognitive skill learning outcomes include the ability to:

 Apply conceptual understanding of concepts, principles, theories and
 Apply procedures involved in critical thinking and creative problem solving, both when required to do so, and when faced with unanticipated new situations
 Investigate issues and problems in a field of study using a range of sources and draw valid conclusions

The levels of cognitive skills expected of Bachelor's Degree graduates
Successful graduates should be able to:

 Undertake investigations, comprehend and evaluate new information, concepts, and evidence from a range of sources, and apply conclusions to a wide range of issues and problems with limited guidance
 Investigate relatively complex problems and recommend creative and innovative solutions taking account of relevant theoretical knowledge and practical experience, and the consequences of decisions made
 Apply these skills and insights in professional and academic contexts relevant to the field of study undertaken

In professional programs, the graduates should not only be able to use routine procedures appropriately, but also identify situations requiring innovative solutions and draw on relevant theoretical and respond to practical insights.
Interpersonal Skills and Responsibility

Interpersonal skills and responsibility learning outcomes include both the ability and the predisposition to:
 Take responsibility for their own learning and continuing personal and professional development
 Work effectively in groups and exercise leadership when appropriate
 Act responsibly in personal and professional relationships
 Act ethically and consistently with high moral standards in personal and public forums

The levels of interpersonal skills and responsibility expected of Bachelor's Degree graduates
Successful graduates should possess the:
 Capacity to contribute to and facilitate constructive resolution of issues in group or team situations, whether in a leadership role or as a member of a group
 Ability to exercise group leadership in undefined situations calling for innovative responses
 Ability to take initiative in identifying issues requiring attention and in address them appropriately on an individual or team basis
 Capacity and acceptance to take responsibility for their continued life-long learning
 Ability to identify and use appropriate means of researching new information or techniques of analysis needed for completion of tasks
 Ability to deal with ethical and professional issues involving values and moral judgments in ways that are sensitive to others and consistent with underlying basic values and relevant professional codes of practice

Communication, Information Technology, and Numerical Skills

Communication, information technology, and numerical skills outcomes include the ability to:

- Communicate effectively in oral and written form
- Use information and communications technology, and
- *Use modern mathematical and statistical techniques*

The levels of communication, information technology and numerical skills expected of Bachelor's Degree graduates

Successful graduates should demonstrate:

- *Ability when investigating issues and problems to identify relevant statistical or mathematical techniques and apply them creatively in interpreting information and proposing solutions*
- *Ability to communicate effectively both orally and in writing, selecting and using forms of presentation appropriate for differing issues and audiences*
- *Use of the most appropriate information and communications technology in gathering, interpreting, and communicating information and ideas*

Psychomotor

Psychomotor skills include manual dexterity and the capacity to manage physical behavior with precision and skill. They include skilled use of equipment and other physical activity (that may be managed consciously or unconsciously), voice production and non-verbal communications.
Descriptions of the level of psychomotor skills expected of a bachelor's degree graduate will vary widely for different fields of study according to the nature of the skills to be developed in different academic areas or professional fields

The levels of psychomotor skills expected of Bachelor's Degree graduates

Successful graduates should demonstrate levels of achievement appropriate to their field of study:

- An ability to use sensory cues to guide motor activity
- Skillful performance of motor activities
- Coordination of a series of activities to achieve internal consistency
- Achievement of high levels of motor skills performance naturally

ASIIN Requirements for Bachelor's Degree of Mathematics Program

The diverse professional opportunities of graduates of degree programs in mathematics are based on a sound mathematical education and thorough training, encompassing broad basic knowledge as well as scientific work methods. The Bachelor's degree program facilitates regular completion of a degree with an early career start on the one hand, while on the other hand permitting faster progress of students aiming to do an additional non-mathematical degree (e.g. for consulting, marketing, business, finance, patents etc.).
The **following learning outcomes** (knowledge, skills or competences)[1] are typical of a **Bachelor's degree in mathematics**:

Specialist learning outcomes
Graduates

(a). have sound mathematical knowledge. They have a profound overview of the contents of fundamental mathematical disciplines and are able to identify their correlations.
(b). are able to recognize mathematics-related problems, assess their solvability and solve them within a specified time frame.
(c). have a basic ability to work in a scientific way. They are in particular able to formulate mathematical hypotheses and have an understanding of how such hypotheses can be verified or falsified using mathematical methods.
(d). Can flexibly apply mathematical methods of fundamental component areas of mathematics and are able to transfer the findings obtained to other component areas or applications.
(e). have abstraction ability and are able to recognize analogies and basic patterns.
(f). are able to think in a conceptual, analytical and logical manner.
(g). have an extensive comprehension of the significance of mathematical modeling. Are able to create mathematical models for mathematical problems as well as for problems.
(h). can use basic methods of computer-aided simulation, mathematical software and programming to solve mathematical problems
(i). are in a position to solve more extensive mathematical problems (generally to be proven within the framework of a Bachelor's thesis)

Social learning outcomes

Graduates can

(j). Classify, recognize, formulate and solve mathematics-related problems.
(k). Use electronic media competently.
(l). Implement lifelong learning strategies. A prerequisite for this is that the students are persevering and that they have developed persistence.
(m).can recognize, formulate, classify and solve problems in a mathematical context
(n). can communicate, possibly also in a foreign language, and contribute their work effectively in teams

Mathematics outcomes

Graduates will have:

Mathematics program outcomes			ASIIN	NCAAA
a.	**An ability to:**			**Knowledge** Facts, concepts, principles, theories, and procedures
	1.	Apply knowledge of basic and advanced mathematics including multivariate calculus, differential equations, linear algebra, probability and statistics.	**a, b**	
	2.	Apply knowledge of basic sciences including general chemistry and basic physics.	**b, c, h**	
b.	**A knowledge of contemporary issues, including:**			**Knowledge** Facts, concepts, principles, theories, and procedures
	1.	Economic issues.	**d, i**	
	2.	Technological issues.	**i, m**	
c.	**An ability to:**			**Cognitive** *Apply skills when asked Creative thinking and problem solving*
	1.	Demonstrate facility with axiomatic reasoning, including writing accurate, rigorous mathematical proofs.	**f, j**	
	2.	Make effective use of abstraction and inductive reasoning as key characteristics of the language and structure of mathematics and abstract data types in object-oriented programming.	**e**	
d.	**An ability to:**			**Cognitive** *Apply conceptual understanding of concepts, principles, theories*
	1.	Design and use valid mathematical models and use them to solve realistic problems, employing techniques from physics, computer algorithms, and mathematics.	**h**	
	2.	Engage in statistical reasoning, including the capacity to produce and interpret statistical information, and to make proper discernments in matters of precision and significance.	**d, e**	
	3.	Analyze and interpret experimental data.	**e, h**	

Mathematics program outcomes			ASIIN	NCAAA
e.	**An ability to:**			**Cognitive** *Apply procedures involved in critical thinking and creative problem solving*
	1.	Identify a Mathematical problem from a word statement or observation of a situation.	**k**	
	2.	Formulate or idealize the identified problem as a mathematical model.	**l**	
	3.	Solve the formulated problem by applying the technical skills gained in various classes.	**k, l**	
f.	**An ability to:**			**Cognitive** *Investigate issues and problems in a field of study using a range of sources and draw valid conclusions*
	1.	Develop and demonstrate habits of effective thought.	**h, f**	
	2.	Reason analytically to distinguish "possible" from "necessary," to recognize assumptions, to identify logical fallacies, and to develop coherent arguments.	**f, k**	
g.	**An ability to:**			**Responsibility** *Capacity to contribute to and facilitate constructive resolution of issues in group or team situations, whether in a leadership role or as a member of a group*
	1.	Function on a team.	**o**	
	2.	Function on a multi-disciplinary team.	**o**	
h.	**An ability to:**			**Responsibility** *Ability to take initiative in identifying issues requiring attention and in address them appropriately on an individual or team basis*
	1.	Understand the importance of professional responsibility regarding product liability.	**n**	
	2.	Understand codes of ethics and their importance.	**n**	
i.	**A recognition that:**			**Responsibility** *Capacity and acceptance to take responsibility for their continued life-long learning* *Ability to deal with ethical and professional issues involving values and moral judgments*
	1.	Recognize life-long learning is a necessity as well as a responsibility of every Graduate	**n**	
	2.	The familiarity with modern technological tools is a must for today Mathematicians.	**i**	
j.	**An ability to:**			**Communication** *ability to:*
	1	Organize, connect, and communicate mathematical and algorithmic ideas.	**o**	

Mathematics program outcomes			ASIIN	NCAAA
	2.	Acquire facility with several significant technological tools, and use them effectively for computation, exploration, and presentation.	**i**	• *Communicate effectively in oral and written form* • *Use information and communications technology, and* • *Use modern mathematical and statistical techniques*
	3.	communicate effectively orally, visually, and in writing	**o**	
	4.	use modern mathematical and statistical techniques	**i**	
	5.	Use information and communications technology.	**i, m, o**	
k.	**An ability to:**			**Psychomotor** • *Psychomotor skills include manual dexterity and the capacity to manage physical behavior with precision and skill.*
	1.	Select appropriate analytic and design tools for Mathematical problems.	**k, l**	
	2.	Use technological application software as analysis and application design tools..	**i, m**	
	3.	Utilize a computer as an office tool. Assumptions, to identify logical fallacies, and to develop coherent arguments.	**i, m**	

MATH Course Objectives and Outcomes

Due September 3, 2005

Course Number: _____Course Name: _ _____

Prepared by: ___ _____

Table 1 – Please fill in this table based on the following criteria:

1. Based on your course syllabus, provide 3 - 5 *major course objectives* in column 1 along with 2 - 3 *outcomes for each objective* in column 2.
2. In column 3, indicate how the objectives and outcomes in column 1 and 2 map into ME Program Learning Outcomes (PLO)
3. In column 3, indicate how the objectives and outcomes in columns 1 and 2 *map* into the NCAAA Outcomes
4. In column 4, indicate how the objectives and outcomes in columns 1 and 2 *map* into the Asiin criteria

Course Objectives:	Course Outcomes:	PLO	NCAAA	Asiin
1.	1.			
	2.			
	3.			
2.	1.			
	2.			
	3.			
3.	1.			
	2.			
	3.			
4.	1.			
	2.			
	3.			

Table 2: Based on your course syllabus, indicate how your course is *assessed*. If an item is given but not assessed, simply leave the last 4 columns blank.

Assessment Method	Number/Type				Instructor Assessed	TA/Grader Assessed	Peer/Self Assessed
Homework							
Mid Terms/Final Exams							
Quizzes							
Individual Projects	1-2 wks	3-4 wks	1/2 sem	Full sem			
Team Projects	1-2 wks	3-4 wks	1/2 sem	Full sem			
Lab Assignments							
Computer Assignments							
Computer Tools Used	(e.g., C, FORTRAN, Matlab)						
Oral Presentations							
Written Reports							
Other							

Course: **Developed by:**

Course Competency	Mastery Level	Core Competency (Y/N)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

Course: **Developed by:**

Course Prerequisite Competency	Mastery Level
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

Department of Mathematics

Summary of NCAAA course information for BSc Mathematics degree

Course Description

Number of Credits

Prerequisites by Course

Prerequisites by Topic

Textbook(s)/ Required Material

Course Topics

Course Objectives

Course Outcomes

Individually each student will be able to:

Class/Laboratory Schedule

Computer Applications

Laboratory Projects

Contribution to Meeting the Professional Component

Science/Design Contents

Assessment Tools

Prepared by

Date of Preparation

Revised

Course Assessment by ME Faculty

Course: _____ Semester _____ Instructor _____

The Department Accreditation Committee (DQC) uses the following report in its efforts to continuously improve the ME Programs. The report should be completed and submitted before the end of Finals.

1. Are the prerequisites for this course adequate (if not what changes do you recommend)?

2. Are the students entering with the expected mastery of these prerequisites (if not what fraction fall short of expectations)?

3. Discuss the ease/difficulty that the students had in demonstrating mastery of the core course competencies

4. What, if any, recommendations do you have for improvement relative to: course outcomes, **core** competencies, and/or Program Objectives and Outcomes.

5. Do you have any other comments that might help the DQC improve the Program?

Student Sign Off Form for ME Course

Course: _____ Semester ___ Instructor_____

MATH Department Grading Guidelines

MATH courses are assessed using the following condition:
A grade of C or better can only be given to a student who demonstrates mastery of **all** the course core competencies.

Acknowledgment of Reading

You were given a number of documents during your first class to read. Please read the following statements, sign, make a copy for your records (optional), and return this signed copy to your instructor within the first week of class. If you feel you cannot sign this document please discuss the reasons with your course instructor.

1. I received and read a copy of the Mathematics Program Objectives and Outcomes
2. I received and read a copy of the Course Objectives, Outcomes, and Competencies
3. I have noted the **Core** Competencies contained within the Course Competencies
4. I have read the grading guidelines above and know that I can only receive a grade of C or better if I demonstrate mastery of **all** the **Core** Competencies.

_____
Signature