Please complete this form and attach a copy of the syllabus for new courses. Forward it as an email attachment to the Secretary of the Graduate Council. A printed copy of the form with signatures should be brought to the Graduate Council Meeting. Complete the Coordinator Form on page 2, if changes in this course will affect other units.

Please indicate:  ___X_ NEW  ____ MODIFY  ____ DELETE

Local Unit:  ECE/TCOM  Graduate Council Approval Date:  May 24th, 2004

Course Abbreviation:  Foundation course  Course Number:  TCOM 575

Full Course Title:  Quantitative Foundations for Telecommunications

Abbreviated Course Title (24 characters max.): Quant. Foundat. for TCOM

Credit hours:  3  (NOTE: This course may not be taken for credit in any IT&E Graduate Degree Program)  Program of Record:  TCOM

Repeatable for Credit?  ___ D=Yes, not within same term  Up to hours
              ___ T=Yes, within the same term  Up to hours
              ___ N=Cannot be repeated for credit

Activity Code (please indicate):  ___ Lecture (LEC)  ___ Lab (LAB)  ___ Recitation (RCT)
                              ___ Studio (STU)  ___ Internship (INT)  ___ Independent Study (IND)  ____ Seminar (SEM)

Catalog Credit Format  3: 3 : 0  Course Level:  GF(500-600)  ___X_  GA(700+)

Maximum Enrollment:  35

For NEW courses, first term to be offered:  Spring 2005
Prerequisites or corequisites:  Graduate standing or permission from department

Catalog Description (35 words or less):  Please use catalog format and attach a copy of the syllabus for new courses.: Provides quantitative foundations in mathematical and electrical concepts to permit registration for courses in the Telecommunications MS degree and certificate programs. Topics include those mathematical and engineering concepts required before entering in the TCOM program.  NOTE: This course cannot be used for credit in any IT&E graduate degree program.

For MODIFIED or DELETED courses as appropriate:  Not applicable

Last term offered:  Previous Course Abbreviation:  Previous number:

Description of modification:

APPROVAL SIGNATURES:
Submitted by:  ____Jeremy E. Allnutt__________ email: _jallnutt@gmu.edu

Department/Program:  ____ECE/MS in TCOM__________ Date: __June 8th, 2004___

College Committee: ________________________________ Date: ____________________

Graduate Council Representative: ________________________________ Date: ____________________
Not applicable – TCOM 575 will not affect any other units outside of the TCOM program.

Approval from other units:

Please list those units outside of your own who may be affected by this new, modified, or deleted course. Each of these units must approve this change prior to its being submitted to the Graduate Council for approval.

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<th>Unit:</th>
<th>Head of Unit’s Signature:</th>
<th>Date:</th>
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Graduate Council approval: ______________________________ Date: __________

Graduate Council representative: __________________________ Date: __________

Provost Office representative: ____________________________ Date: __________
1. CATALOG DESCRIPTION
   (a) TCOM 575 Quantitative Foundations for Telecommunications (3.0:3.0:0)
   (b) Prerequisites: graduate standing or permission from department
   (c) Catalog Description:
       Provides the quantitative foundations in mathematical and electrical concepts to permit
       registration for courses in the Telecommunications MS degree and certificate programs. Topics
       include polynomials, exponentials, linear and quadratic equations, graphs and functions,
       trigonometric functions, radial measure and sine/cosine functions, exponentials and logarithms,
       basic probability and statistics, fundamentals of matrix algebra and vectors, basic Boolean
       logic; circuit elements (resistor, capacitor, inductor), basic electrical circuits, units, ohm’s law,
       kirchhoff’s law, decibel notation. NOTE: This course cannot be used for credit in any IT&E
       graduate degree program.

2. JUSTIFICATION
   (a) Course Objectives
       The MS in Telecommunications (TCOM) degree and certificate programs are designed for students
       who do not have an undergraduate degree in electrical engineering, but who do have an
       undergraduate degree with strong quantitative elements in it. Many prospective students would like
       to enter the TCOM program, but lack either experience in the telecommunications industry or a
       degree with a quantitative or technology background. This course is intended to provide students
       with the quantitative background that they will need to complete the core courses in the MS in
       Telecommunications degree and certificate programs successfully. Students have the option of
       testing out of TCOM 575 by demonstrating through an exam that they have already mastered the
       topics to be taught, even though their college transcripts do not supply sufficient evidence of
       understanding the TCOM 575 topics.

   (b) Course Necessity
       New students in the TCOM program generally enter the TCOM 500 course to begin their degree
       program. This course introduces the student to a large range of telecommunications topics and
       analytical processes that, if the student does not have a quantitative undergraduate degree, is difficult
       to master. A number of graduate students who want to enter the TCOM program do not have an
       undergraduate degree with a strong quantitative or technology element, nor do some have
       compensating experience that would have provided this knowledge through employment in
       telecommunications industry. It has therefore been found necessary to offer this foundation course
       to enable such students to complete the core TCOM courses successfully.

   (c) Relationship to Existing Courses
       The course is a natural requirement for new TCOM students who do not possess an undergraduate
       degree with a strong quantitative element but who, nevertheless, want to pursue a TCOM degree or
       certificate. Many other graduate programs have such foundation courses for their incoming students
       who lack the preparation to succeed in the degree they wish to pursue. Examples are SYST 500 in
       the systems engineering program and INFS 501 in the Information Systems program.

3. APPROVAL HISTORY
   ECE Department Date: April 30th, 2004
4. SCHEDULING
Every fall and spring, starting fall 2004.
Proposed Instructors: Dr. Jeremy Allnutt and qualified faculty, and by qualified adjunct professors from local telecom companies or government laboratories.

5. COURSE OUTLINE
(a) Syllabus

**Week 1**
Introduction and outline of course; review of basic concepts
Review chapter

**Week 2**
Equations and inequalities; linear equations, complex numbers, quadratic equations
Chapter 1

**Week 3**
Graphs and functions
Chapter 2

**Week 4**
Polynomials and rational functions
Chapter 3

**Week 5**
Exponential and logarithmic functions
Chapter 4

**Week 6**
TEST 1
Trigonometric functions
Chapter 5

**Week 7**
Circular functions and their graphs; radian measure, circular functions
Chapter 6

**Week 8**
Applications of trigonometry; law of sines, cosines, vectors and operations
Chapter 8

**Week 9**
Systems and matrices; basic probability
Elements of Chapter 9 and Chapter 11
Week 10
Basic Boolean logic
Instructor’s notes
TEST 2

Week 11
Introduction to electrical engineering circuits; units, circuit elements (sources, resistors, capacitors, inductors)
Instructor’s notes

Week 12
Introduction to decibel notation, ratio of similar units, ratio of basic unit (e.g. dBW, dBm, dBK)
Review of Chapter 4 and instructor’s notes

Week 13
Basic electrical formulas: Ohm’s law, Kirchhoff’s law, parallel and series resistors
Instructor’s notes

Week 14
Basic electromagnetic principles: current in a wire, skin depth, evanescent fields, coaxial cable, waveguide, principle of modes, generation of a radiated field, polarization states
Instructor’s notes

Week 15
Final exam

(b) Reading and Reference Material

**Mandatory text:**
“College Algebra and Trigonometry”, third edition,
Margaret L. Lial, John Hornsby, and David I. Schneider,
Addison-Wesley, 2005

**Supplementary texts:**
“Basic Engineering Circuit Analysis”, seventh edition,
J. David Irwin,
Wiley, 2002,

“Introduction to logic design”, second edition,
Alan B. Marcovitz,
McGraw-Hill, 2005
ISBN 0-07-286516-4

“The essential guide to RF and wireless”, second edition,
Carl J. Weisman
Prentice-Hall, 2002
ISBN 0-13-035465-1
(c) Student Evaluation Criteria

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<tr>
<td>Homework</td>
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<tr>
<td>Test I</td>
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<tr>
<td>Test II</td>
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<tr>
<td>Final</td>
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