University of North Texas
College of Engineering
Department of Engineering Technology (ETEC)

MSET 5040 Analytical Methods in ET
(Electrical Systems and Mechanical Systems Tracks)

Catalog 14-15  Study of mathematical methods and techniques typically used in solving engineering problems. Emphasis is placed on the applications of the various techniques and on the effective utilization of modern computer simulation tools.

Prerequisite  Graduate standing or consent of department

Lab Use  This course provides opportunities for students to take advantage of various software packages such as Matlab/Simulink supported by the department.

Text  “Analytical Methods in ET - Presented as a Dialog with Students”, E. Barbieri, 2016. Additional reading materials can also be found from the first several chapters or appendices on mathematical tools and application examples found in textbooks in the area of Linear Systems and Engineering Mathematics.

Instructor  Enrique Barbieri, Ph.D
Professor and Chair, Engineering Technology
Office F115 ~ Office Hours: TBD

STUDENT LEARNING OUTCOMES
Students will demonstrate (1) an advanced ability to use selected mathematical tools, and (2) an appreciation for transferring analytical methods to various engineering application areas of interest.

TOPICS: the instructor will select items from the following list at various depths, and may add other items
- dynamic system modeling via differential/difference equations (ordinary, nonlinear, and partial)
- dynamic system analysis & simulation using Matlab/Simulink
- state equations for multi-input / multi-output systems and sampling
- transform applications in system analysis (Fourier, Laplace and Z)
- linear algebra (matrix exponential, transformations, solutions of differential/difference equations)
- system concepts (stability, controllability, observability)
- introduction to feedback, automatic control, state estimation, and optimization
- separation of variables to solve PDEs; introduction to finite-element modeling

CLASS POLICIES
1. The syllabus is subject to change during the semester with changes to be announced in class.
2. The UNT Catalog procedures on academic dishonesty will be vigorously enforced. It is the duty of all students to protect their work so it is not available to others for submission as their efforts. Students who knowingly allow others to use their work are partners in this unethical behavior.
3. Students in need of academic accommodations for disability can refer to the UNT Policy manual for initiating the required arrangements based on ADA terms.
4. The Student Perceptions of Teaching (SPOT) is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught. I am very interested in the feedback I receive from students, as I work to continually improve my teaching. I consider your evaluation an important part of your participation in this class.
5. The use of communication, computing, or other electronic devices including laptops may be disallowed during class and/or exams at the discretion of the instructor.
6. No late work makeups, or extra credit. An exception to this policy requires a verifiable and sound excuse.
On Work and Academics
A typical 3-credit class, meeting 3 hours per week, may require on average 3-to-7 additional hours of work per week that includes reading/catching up from the previous class and revising notes; preparation for the next class meeting, that is, reading ahead and formulating questions; solving additional practice problems; preparing for lab work if applicable (for example, pre-lab designs) and writing lab reports (applicable to courses with a lab component); and taking care of homework assignments. The total is 6-10 hours per week per 3-credit course. Hence, a student taking a full-time load of say 12 credits (four 3-credit classes) requires on average 24-40 hours of academic work per week; this is why it is called a full-time load. Trying to also fit a part-time job always takes a toll and should probably be relegated to the weekends. My advice is that your academic load needs to be carefully balanced with all other non-academic activities, and accept the fact that if you work, then you must be a part-time student.

Grading & Instructor’s Expectations:
Students are expected to attend every class. The student’s abilities will be demonstrated via homework, projects, quizzes, exams, and projects. A final exam and at least two semester exams will be scheduled. Successful students attempt to solve many more problems than those assigned for credit to develop the practice and the necessary skills. Homework is due at the start of class (unless otherwise specified) at which time solutions may be distributed and discussed. You are encouraged to work in groups and learn from each other. Individual work must be turned in for grading. You are responsible for understanding the techniques; avoid simply copying the group’s work as this practice typically results in disaster during the exams. Typically, students earn a very good Homework grade; however, quizzes and exams will give you the opportunity to demonstrate your individual understanding of the course material.

ASSUMING that: problems are clearly stated and its solution presented in a professional manner (no scratch work should be turned in) on 8½ paper, single-sided, your name, course and assignment number written at the top of the first page, THEN:

- All problems correct: 100%
- Few minor algebra mistakes leading to incorrect answers: 70% – 90%
- Several algebra mistakes or conceptual errors leading to incorrect answers: 40% – 60%
- Missing or wrong assignment problems, or non-compliance with format: < 40%

Final Grading:
To earn an “A” (above 90%) the student does outstanding work demonstrating excellence in his/her understanding of the course material as shown by performance. To earn a “B”, (above 80%) the student demonstrates good performance to earn graduate credit.

Cumulative Points & Weights:
The table below lists all possible items that earn points toward the final grade and the equivalent % weight. The actual total number of points may be less than the maximum depending on the number of items assigned:

<table>
<thead>
<tr>
<th>Item</th>
<th>Points (max)</th>
<th>%</th>
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<tbody>
<tr>
<td>Homework / Project</td>
<td>100</td>
<td>25</td>
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<tr>
<td>Tests / Quizzes</td>
<td>200</td>
<td>50</td>
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<tr>
<td>Final test</td>
<td>100</td>
<td>25</td>
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<tr>
<td>Total (max)</td>
<td>400</td>
<td>100</td>
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<tr>
<td>Class Participation/Progress/Improvement at the discretion of the Instructor</td>
<td>50</td>
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<tr>
<td>May drop the lowest Homework and/or Quiz grades</td>
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Calendar SP 2015  [http://www.unt.edu/catalogs/2015-16/calendar.htm](http://www.unt.edu/catalogs/2015-16/calendar.htm)
Monday May 9th 1:30PM - 3:30 PM