



## ME 3501 Dynamic Systems & Control Theory

Instructor: Muhammad Salman

Spring 2019

### Mechanical Engineering Department Kennesaw State University ME 3501/01 Dynamic Systems & Control Theory

**Instructor:** Muhammad Salman (Ph.D.), Assistant Professor,  
Mechanical Engineering Department

**Office:** G-122

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**Class times:** Monday 3:30 pm to 4:45 pm in Textile-133

**Office Hours:** *Monday* *Tuesday*  
11:30 am -2:00 pm 11:30 am -2:00 pm  
by appointment or Walk in- Either in Q-217 or G-122

**Text Book:** **System Dynamics (4th Edition)** by Katsuhiko Ogata, ISBN-13: **978-0131424623**

**Reference Book:** **Control Systems Engineering, 5th Edition,**  
By Norman S. Nise, ISBN: 978-0471794752

Modern Control Engineering (5th Edition) by [Katsuhiko Ogata](#)  
ISBN-13: [978-0136156734](#)  
ISBN-10: [0136156738](#)

#### **Prerequisite:**

ENGR 3122 (Engineering Mechanics – Dynamics), MATH 2306 (Ordinary Differential Equations)

#### **HW & Tests:**

Class Participation plus HWs: 15%

2 Quizzes: 25%

2 Tests : 20% each

FINAL Test : 20% (Non-CUMMULATIVE)

#### **Grading:**

[90 - 100% = A, 80 - 89% = B 70 - 79% = C 60 - 69% = D Below 60% = F]

Homework assignments will be assigned after certain modules have been completed. The format for the tests and the exams will be proctored and will be announced well before each test and exam.



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- Late homework and reports will NOT be accepted for credit. Work turned in late may be evaluated to provide you with feedback, but will not be graded / given credit except in cases of emergency.
- HWs will be collected in the class.
- Show all your work for full credit! Write your name on every page. Present your work neatly!

### **Course Outcomes:**

Upon the completion of this course, you should be able to:

An ability to apply knowledge of mathematics, science and engineering

- (a) Apply calculus principles to solve an engineering problem
- (b) Apply differential equation principles to solve an engineering problem
- (c) Apply scientific (physics or chemistry) principles to solve an engineering problem

### **Topics Covered**

- Introduction to Laplace Transform
- Unified approach to lumped-element modeling and analysis of mechanical, electrical, hydraulic, and multi-energy domain systems.
- Topics include: graphical and computer modeling;
- Formulation of state-space equations;
- Analysis of linear systems;
- Determination of time and frequency domain response of such systems to transient and periodic inputs;
- Block diagram representation of dynamic systems using Laplace Transform.
- Feedback control systems, including PID control, root locus, stability analysis, and computer modeling.

### **COURSE POLICIES:**

#### Online Discussions, Assignments and Assessments

Each week will involve online discussions about the text material, additional information on the topic, and questions posted by the instructor or other students. Each student is required to contribute to the discussion in a meaningful way with at least one significant post for the week. Weekly assignments and assessments should be posted before the deadline announced in each Module.

#### Grade of Incomplete



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If a situation arises that is beyond your control, which prevents you from completing the work in this course, you may apply for a grade of Incomplete. You must be passing the course at the time of this interruption. Please advise instructor as soon as an issue arises and instructor will determine your current grade in the course and whether you are eligible for an Incomplete. A grade of Incomplete allows the student to make up the work by the end of the next semester (includes summer semester). However, the student will not be enrolled in the next session of the class and will have to meet all the requirements on his/her own. Instructor will help as best as he/she can, grade all the late work, and administer any tests that need to be taken. But it is student's responsibility to get the work in by the end of the next semester.

### Test Make-up Policy

If a student must miss a Test or final exam due to a documented, legitimate reason (illness with documentation, family death, etc.), an alternate test will be administered. To coordinate this, contact instructor as soon as possible. It is the responsibility of the student to coordinate this in a timely manner.

### Attendance

I encourage you to stay on the class schedule. You'll learn much more, perform better on your assignments. It is your responsibility to do well in this course by staying on the prescribed schedule.

### ACADEMIC HONESTY:

The high quality of education at Kennesaw State University is reflected in the credits and degrees its students earn. **All assignments that take place in and out of the classroom must be your own work and original for this course.** The protection of these high standards is crucial since the validity and equity of the University's grades and degrees depend upon it. Any student found to have violated any KSU academic honesty regulation after a hearing before a university hearing panel or before the Vice President for Student Success and Enrollment Services (or his/her designee) shall be suspended for at least one semester, unless the student persuades the deciding body that the circumstances of his or her behavior substantially mitigate the gravity of the violation. These regulations are designed to assist students in (1) developing appropriate attitudes about, and (2) understanding and following the university's standards relating to academic honesty. The regulations protect students by helping them avoid committing infractions that may compromise the completion of their KSU degrees or damage their reputations.

**Student Conduct Pledge/Statement:** As a member of the Kennesaw State University community of scholars, I understand that my actions are not only a reflection on myself, but also a reflection on the University and the larger body of scholars of which it is a part. Acting unethically, no matter how minor the offense, will be detrimental to my academic progress and self-image. It will also adversely affect all students, faculty, staff, the reputation of this University, and the value of the degrees it awards. Whether on campus

or online, I understand that it is not only my personal responsibility, but also a duty to the entire KSU community that I act in a manner consistent with the highest level of academic integrity. Therefore, I promise that as a member of the Kennesaw State University community, I will not participate in any form of academic misconduct.

### **Types of Academic Misconduct:**

1) **Cheating:** Receiving, attempting to receive, knowingly giving or attempting to give unauthorized assistance in the preparation of any work required to be submitted for credit (including examinations, laboratory reports, essays, themes, term papers, etc.) is considered cheating, as is engaging in any behavior that a professor prohibits as academic misconduct in the syllabus or class discussion. Unless specifically authorized, using and/or having access to electronic devices during an examination, quiz, test or other assessment is automatically considered cheating, regardless of the student's reason for using/accessing the device;

2) **Plagiarism:** Including direct quotations from other sources into work required to be submitted

for credit without indicating them as such by quotation marks, block quotes or other appropriate formatting. Incorporating the work of someone (e.g. ideas, theories, data, figures, graphs, programs, electronic based information, illustrations, etc.) into a paper or project without due acknowledgement;

3) **Self-Plagiarism:** Submitting any work for credit which was not authored specifically and originally for the assignment in question without the prior permission of the professor receiving that assignment. Most commonly, this means submitting the same, or substantially the same, paper or other assignment for credit in more than one class;

4) **Misrepresentation and/or Falsification:** Knowingly providing false information in completing University forms or applications (including admissions forms, scholarship applications, time sheets, false or counterfeit transcripts, etc.) or in any work submitted for credit. This includes providing fabricated/altered documents to substantiate an excused absence (such as to meet attendance requirements or have the chance to make-up a missed exam). Signing in for another student or having another individual sign in on a student's behalf on an attendance sheet also constitutes a violation of this code section.

5) **Unauthorized Access to University Materials:** Taking, attempting to take, stealing or in any unauthorized manner otherwise procuring, gaining access to, altering or destroying any material pertaining to the conduct of a class (including tests, examinations, grade change forms, grade rolls, roll books, laboratory equipment, University grade records in written or computerized form, etc.).

6) **Malicious/Intentional Misuse of Computer Facilities/Services:** Maliciously or intentionally misusing university-controlled computer facilities and services. This includes violations of state and federal laws (e.g. copyright violations, unauthorized access to systems, alteration/damage/destruction, or attempted alteration/damage/destruction, use for profit, etc.) or a department's rules for computer usage (e.g. account violations, damage, or destruction of the system and/or its performance, unauthorized copying of electronic information, use of threatening or obscene language, etc.).



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7) Malicious **Removal, Retention or Destruction of University Resource Materials:** Misplacing, taking, destroying any item or part of an item belonging to or in the protection of the University (or the attempt thereof) with the intention of bringing about an undue disadvantage in the academic pursuits of other Kennesaw State University students.

These examples of academic dishonesty shall not be construed to be comprehensive, and infractions will be dealt with on an individual basis according to university policies and procedures. It is the obligation of each student to assist in the enforcement of academic standards.

See: **The KSU Student Code of Conduct at KSU Codes of Conduct-2015.pdf**

**Enforcement:** This policy is strictly enforced. Please note, **I reserve the right to select any paper and/or assignment that are turned in for a grade for plagiarism review. Plagiarism review consists of running your paper/assignment through various search engines and databases at my disposal in order to check for “borrowed” or “bought” information. Students will be required to use TurnItIn.Com to have their papers reviewed for plagiarism.** If you are found in violation of academic dishonesty, then you will be subject to the enforcement policies and procedures, as outlined by the University and the Department.

### **WEB ACCESSIBILITY:**

Kennesaw State University follows the guidelines of the Universal Design for Learning standard of web accessibility. Faculty use Word, PDF, and HTML formats when communicating electronic information to students whenever possible and appropriate in light of the goals of the course. Faculty are trained to use Web Accessibility Evaluation tools, e.g., WAVE ([www.wave.webaim.org](http://www.wave.webaim.org)), and make adjustments as possible and appropriate in light of the goals of the course. For free resources available to students on web accessibility, please visit the Web Accessibility Resources page at the Distance Learning Center: <http://www.kennesaw.edu/dlc/facultyresources/index.php#>

### **KSU SEXUAL MISCONDUCT POLICY:**

Kennesaw State University adheres to KSU’s policy prohibiting sexual misconduct both in and out of the classroom. Questions about this policy should be directed to the KSU Equal Employment Opportunity (EEO) and Title IX officer by telephone at (470) 578-2614. You may also visit the University’s EEO website <http://www.kennesaw.edu/eo/index.html> for more information.

### **COPYRIGHT LAW:**

Kennesaw State University adheres to USG’s policy to respect the right of copyright. Holders and comply with copyright laws as set forth in the United States Copyright act. For more information, see the following link to USG’s policy: <http://www.usg.edu/copyright/>



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### **STUDENT RECORDS/FERPA:**

Kennesaw State University adheres to the Family Educational Rights & Privacy Act of 1974 – FERPA. See the following link for more information:

[http://www.usg.edu/information\\_technology\\_handbook/section9/tech/9.5\\_privacy\\_and\\_security](http://www.usg.edu/information_technology_handbook/section9/tech/9.5_privacy_and_security)

### **ELECTRONIC RECORDING AND SOCIAL MEDIA:**

Electronic recording performed without the consent of the people being recorded chills the free exchange of ideas. Academic freedom, free inquiry, and freedom of expression should not be limited by the fear that one's brainstorming, polemic discourse, speculative inquiry, or any other kind of expressed curiosity made within the space of a university classroom will be made public without one's consent. This fear is unacceptable regardless of whether one is in an online, hybrid, or face-to-face classroom setting.

Accordingly, no person shall make public any electronically recorded class discussion without the written permission of the instructor. This policy is not intended to discourage electronic recording in the classroom or the use of social media when such actions are performed with the written consent of the instructor, and others as appropriate. Note: Faculty accommodate all reasonable requests to electronically record a class discussion; these requests must be documented by the Disabled Student Support Services available at: [http://www.kennesaw.edu/stu\\_dev/dsss/prospect.shtml](http://www.kennesaw.edu/stu_dev/dsss/prospect.shtml)

### **DISRUPTION OF CAMPUS LIFE STATEMENT:**

It is the purpose of the institution to provide a campus environment, which encourages academic accomplishment, personal growth, and a spirit of understanding and cooperation. An important part of maintaining such an environment is the commitment to protect the health and safety of every member of the campus community. Belligerent, abusive, profane, threatening and/or inappropriate behavior on the part of students is a violation of the Kennesaw State University Student Conduct Regulations. Students who are found guilty of such misconduct may be subject to immediate dismissal from the institution. In addition, these violations of state law may also be subject to criminal action beyond the university disciplinary process.

### **COURSE ENROLLMENT POLICY:**

**Students are solely responsible for managing their enrollment status in a class; nonattendance does not constitute a withdrawal.**

### **STUDENT SUPPORT RESOURCES**

The following resources and policies are found under this link:

<http://learnonline.kennesaw.edu/resources/index.php>



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### **DISABLED STUDENT SUPPORT SERVICES**

**In compliance with applicable disability law, qualified students with a disability may be entitled to reasonable accommodation.** Any student with a documented disability (hidden or visible) needing academic adjustments, including classroom or test accommodations is requested to notify the instructor within the first two weeks of the course. **Verification from KSU Disabled Student Support Services is required. All discussions and documentation will remain confidential.**

Disabled Student Support Services  
James V. Carmichael Student Center Addition – 2<sup>nd</sup> Floor, Suite 267  
470.578.6443

[http://www.kennesaw.edu/stu\\_dev/dsss/prospect.shtml](http://www.kennesaw.edu/stu_dev/dsss/prospect.shtml)

Please visit the Student Disabilities Services website at  
[www.kennesaw.edu/stu\\_dev/sds](http://www.kennesaw.edu/stu_dev/sds) for more information

### **Student Rights and Responsibilities**

Students of Kennesaw State University are entitled to an environment that is conducive to learning and individual growth. To this end, students enrolling at Kennesaw State University assume a responsibility to abide by the policies and regulations expressed in this section. By doing so, students may fulfill their responsibilities and enjoy the exercise of their own rights while also respecting the rights of others.

All rights and responsibilities may be found in the University Catalog at [catalog.kennesaw.edu](http://catalog.kennesaw.edu).

| WEEK  | HW/QUIZ/EXAM | CHAPTER     |
|-------|--------------|-------------|
| 1-2   |              | CH 1        |
| 2 -3  | Quiz1        | CH 2        |
| 4 -5  |              | CH 3, CH 4  |
| 6-7   | Test 1       | CH 4, CH 5  |
| 8-9   | Quiz 2       | CH 6, CH 8  |
| 10-11 |              | CH 9, CH 10 |
| 12-13 | Test 2       | CH 11       |
| 14-15 | Final Exam   |             |