Instructor: Lili Dong  
Phone: 216-687-5312  
Email: L.Dong34@csuohio.edu  
Office: #334 Stilwell Hall  
Office Hours: T TH 2:00PM- 4:00PM or by appointments.

Class Time: T TH, 4:00-5:50 PM

Place: SH 314

Prerequisite: MTH284: Matrices for Engineers or MTH288: Linear Algebra.

Content: The following topics will be covered in this course.
- Fundamental concepts in linear system theory: matrix algebra, linear vector space, linear operator, linearity, linearization, and eigenvalues and eigenvectors.
- Input-output and state-space models.
- Solutions of linear dynamic equation and impulse response.
- Control system design: linear observer design and feedback controller design.

Objectives: After taking this course, students should be able to
- derive linear space models of linear/linearized physical systems;
- design state feedback controllers based on the models;
- be well prepared to take more advanced control courses;
- gain the experience with the software Matlab/Simulink for control system design, simulation, and analysis.


Grading:  
- Quizzes 20%
- Midterm Exam 25%
- Homework 25%
- Final Exam 25%
- One Information Literacy Project: 3%
- Attendance of Invited Talks: 2%

Grading Scale:
- A......................... 93-100
- A minus.................... 90-92
- B plus...................... 87-89
- B........................... 83-86
- B minus................... 80-82
- C ......................... 70-79
- D......................... 60-69

Homework:  
Homework is a primary learning tool in this course. The following rules will be followed in the class.
- Homework will be passed out and due on every other Thursday.
- **NO LATE HOMEWORK WILL BE ACCEPTED!!!** Any assignment not turned in when due will result in a ZERO.
- All homework is strictly individual effort. Discussion with other students is encouraged, but you must turn in your own work. **IDENTICAL HOMEWORK WILL BE GIVEN A GRADE OF ZERO!!!**
- The pages should be stapled, and the problems should be in order.
- Carefully print and sign your name on the first page of your homework.

Tests:

- There are two one-hour quizzes, one two-hour midterm exam, and one two-hour final exam.
- Quizzes and Exams will be closed book and closed notes with time limits strictly enforced.
- The date of each test is shown on Course Outline.
- **NO make-up quizzes or exams** will be given unless the approval is obtained from the instructor BEFORE the test. Students are obliged to show up at the scheduled time of make-up exam. Otherwise, he/she will receive a zero for the exam.

Attendance:  
Students are expected to attend ALL classes! If a student must be absent due to university business or illness, the student is obliged to contact the instructor PRIOR to the absence or tardiness. The instructor reserves the right to limit the quality/quantity of out-of-class assistance to students with excessive absences. If a student misses one fourths of classes, he/she will automatically FAIL this course.

Classroom:  
My goal is to create a cooperative, tolerant classroom that involves all students
Policies: in different learning activities. Classroom behavior will be governed by four policies that will help produce a tolerant, cooperative classroom. The four policies are:

- Students will NOT be allowed to leave this class unless it is an emergency or sickness.
- Come to class ON TIME or early.
- Everyone, including the instructor, will be treated with respect. Putdowns and purposely hurtful comments or actions will not be tolerated.
- No one will be allowed to disrupt the learning process of anyone else. NO chatting and discussing in classes unless it is allowed by the instructor.


Others: All important notices from instructor will be sent to students through EMAILS.

Tentative Course Outline:
(Chapter 3, chapter 14, and chapter 15 of the textbook will not be covered in the course.)

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Material</th>
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<tbody>
<tr>
<td>1</td>
<td>8/26-8/28</td>
<td>Introduction, general review (1.1-1.3), physical system modeling, introduction of linear systems, introduction to state variable.</td>
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<tr>
<td>2</td>
<td>9/2</td>
<td>Information Literacy Skills (The lecture will be given by Ms. Theresa M. Nawalaniecz from university library)</td>
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<td>2</td>
<td>9/4</td>
<td>State variables and state equations (3.1-3.4)</td>
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<td>3</td>
<td>9/9-9/11</td>
<td>State equations, discrete-time systems, linearization of nonlinear systems</td>
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<td>4</td>
<td>9/16-9/18</td>
<td>Fundamentals of matrix algebra (4.1-4.11)</td>
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<td><strong>Quiz 1</strong> on 9/16 (Lectures of weeks 1, 2, and 3)</td>
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<tr>
<td>5</td>
<td>9/23-9/25</td>
<td>Vectors and linear vector spaces (5.1-5.13)</td>
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<td>6</td>
<td>9/30-10/2</td>
<td>Orthonormalization and linear operators</td>
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<td>7</td>
<td>10/7</td>
<td>Simultaneous linear equations I (6.1-6.2, 6.9)</td>
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<td>7</td>
<td>10/9</td>
<td><strong>Midterm Exam</strong> (Lectures of weeks 1-6)</td>
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<td>8</td>
<td>10/14</td>
<td>Simultaneous linear equations II (6.2, 6.9)</td>
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<td>8</td>
<td>10/16</td>
<td>Eigenvalues and eigenvectors I (7.1-7.2)</td>
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<td>9</td>
<td>10/21</td>
<td>Eigenvalues and eigenvectors II (7.3-7.4)</td>
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<td>9</td>
<td>10/23</td>
<td>Functions of square matrices (81.-8.6)</td>
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<td>10</td>
<td>10/28-10/30</td>
<td>Analysis of linear state equations (9.1-9.4), <strong>Quiz 2</strong> on 10/30 (Lectures of weeks 7-9)</td>
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<tr>
<td>11</td>
<td>11/4-11/6</td>
<td>Stability (10.1-10.6)</td>
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<td>12</td>
<td>11/13</td>
<td>Controllability and observability I (11.1-11.2)</td>
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<tr>
<td>13</td>
<td>11/18-11/20</td>
<td>Controllability and observability II (11.3-11.5)</td>
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<td><strong>Quiz 3</strong> (Lectures of weeks of 10-12)</td>
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<td>14</td>
<td>11/25</td>
<td>Design of feedback control system (13.1-13.4)</td>
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<td>15</td>
<td>12/2-12/4</td>
<td>Design of feedback control system (13.4, 13.6, 13.7)</td>
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<td>16</td>
<td>12/9</td>
<td><strong>Final Exam</strong></td>
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