MAE 460 - Automatic Controls – Fall 2018
Department of Mechanical and Aerospace Engineering

INSTRUCTOR: Marcello R. Napolitano. Office: 941 ESB
E-mail: Marcello.napolitano@mail.wvu.edu.
Note: I do not use the WVU MIX email account!!

OFFICE HOURS: M-W from 2:00 PM to 3:00 PM. If the instructor is not available in
those hours “make-up” office hours will be allocated in the same week.
The TA will also have office hours on T-Th-F (to be announced).

CREDIT: 3 hrs.

John Wiley. The instructor will provide several handouts.

GOALS: This goal of this course is to provide understanding of the key concepts of
automatic controls. The course will be conducted with an extensive use of the
Matlab®/Simulink® package.

LEARNING OUTCOMES: Students are expected to learn to design simple control systems for Single
Input – Single Output dynamic systems using proportional controller or
Compensation-type controllers to meet control specifications.

ABET COMPLIANCE Students of the WVU Aerospace Engineering (AE) Curriculum
Related course for ‘Outcome and Goals’ A, C, E, and K.
Students of the WVU Mechanical Engineering (ME) Curriculum
Related course for ‘Outcome and Goals’ A, K, and L.
Key course for ‘Outcome and Goals’ C and E.

GRADING PROCEDURE:
<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Quizzes</td>
<td>20%</td>
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<tr>
<td>NOTE: Quizzes will be both “announced” and “unannounced”.</td>
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<tr>
<td>Homework</td>
<td>15%</td>
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<tr>
<td>Midterm exams (3)</td>
<td>45%</td>
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<tr>
<td>Final</td>
<td>20%</td>
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The final grade in this course will be assigned using the scale:
90-100 = A; 80-89 = B; 70-79 = C; 60-69 = D, <60 = F.

Class attendance is mandatory and will have a direct impact on your grade; attendance
sheets will be taken every class. The only justifiable absences will be those according to
official WVU policies. Some curving will be done on the final grade. The final grade will
be multiplied by a number equal to the number of attended classes divided by the total
number of classes.

LIST OF TOPICS:
1. Mathematical Modeling of Physical Systems (approx. 5 classes)
2. Laplace Transform Review (approx. 5 classes)
3. Open-loop Transfer Function (approx. 2 classes)
4. Analysis of time response for different systems (approx. 6 classes)
5. Block diagram analysis (approx. 3 classes)
6. Stability analysis (approx. 3 classes)
7. Analysis of steady-state errors (approx. 3 classes)
8. Root-Locus method and controller design via Root Locus (approx. 5 classes)
9. Compensation design in the s-domain (approx. 5 classes)
10. Design assessment using MATLAB and Simulink (approx. 3 classes)
11. Analysis of the frequency response using Bode plots (OPTIONAL: approx. 2 classes)
12. State variable modeling. Introduction to the modeling of MIMO systems using state variables (OPTIONAL: approx. 2 classes)

CLASS POLICIES:
- Refer to my Handout #0.
- It is expected that the students will review the material between classes. This is necessary due to the fact that the topics in this course are strongly correlated. Additionally, there will be unannounced quizzes on the material of the previous lecture(s). For this purpose the students are strongly encouraged to take good notes; additionally, the instructor will provide a substantial amount of handouts which, along with the textbook, are designed with the specific purpose of assisting the students in the learning process outside the classroom.
- It is expected that homework are to be prepared in a professional manner with a detailed documentation of the work. Homework is supposed to represent the work by an individual student; cooperation between students while working on homework is neither encouraged nor tolerated. The use of the Solution Manual of the textbook is not allowed or tolerated and will be considered ‘plagiarism’. A “ZERO” score for all the semester’s homework will be assigned to all the parties involved in the homework in the 1st occurrence of ‘plagiarism’. Students are encouraged to consult available WVU material on the definition of ‘academic plagiarism’; Homework is due at the beginning of the class period on the due date. Late homework in my mailbox or under my door will not be accepted without any prior arrangement. NO EXCEPTIONS!
- A make-up test shall be given only if the student can show valid reason as per WVU rules. This has to be arranged before the regularly scheduled test.
- The use of ‘Programmable’ calculators, ‘smart phones’ and/or ‘text storing’ devices is NOT allowed during exams and quizzes. Students are required to use ONLY calculators without programming and text storage capabilities. An automatic ZERO will be assigned in all quizzes and exams where a student is found using any of the above devices. NO EXCEPTIONS!
- The class format will be in the form of lectures; student participation through feedback and questions is strongly requested and encouraged by the instructor. Extra curriculum activities (such as text messaging, use of smart phones, tablets & laptops, reading the DA, …) will NOT be tolerated during the class. Students engaging in these activities will be asked to leave the classroom and will be considered absent for that lecture. NO EXCEPTIONS! An occasional beverage and/or a drink is OK; however, it is not appropriate for students to have meals while attending class. Students consuming food will be asked to leave the classroom.

STATEMENT ON SOCIAL JUSTICE:
WVU is committed to social justice. The instructor of this course concurs with WVU’s commitment and expects to maintain a positive learning environment based upon open communication and mutual respect and nondiscrimination. Our University does not discriminate on the basis of race, sex, age disability, veteran status, religion, sexual orientation, color, or national origin. Any suggestions as to how to further such a positive and open environment will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise us and make appropriate arrangements with Disability Services (293-6700).