

**ROY G. PERRY COLLEGE OF ENGINEERING
CHEMICAL ENGINEERING DEPARTMENT
PRAIRIE VIEW A&M UNIVERSITY**

ASSESSMENT REPORT COVER PAGE

CHEG 4303 PROCESS CONTROL

FALL 2021 SEMESTER

NAME OF INSTRUCTOR: Dr. Jorge Gabitto

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 - 5.1 Assignments assessing students' ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factor. (outcome "2")
 - 5.2 Assignments assessing students' ability to identify, formulate, and solve complex engineering problems (CEP) by applying principles of engineering, science, and mathematics.
(Outcome 1)
 - 5.3 Assignments assessing students' ability to communicate effectively with a range of audiences (Oral & Written)

Detailed Course Syllabus
(Distributed to Students at the beginning of the Semester)

**CHEG 4303-Y01: Process Dynamics and Control
Fall 2021 Syllabus**

General Course Information

Information Item	Information
Instructor:	Dr. Jorge F. Gabitto, Ph. D.
Section # and CRN:	Y01 CRN: 16920
Office Location:	Virtual
Office Phone:	936-261-9409
Email Address:	jfgabitto@pvamu.edu
Office Hours:	10 am. – 1 p.m. Monday, Wednesday, and Thursday
Mode of Instruction:	Hybrid Instructional Method
Course Location:	New Electrical Engr. Bldg. 115
Class Days & Times:	MW 8:00 – 9:20 AM
Catalog Description:	(3-0) Credit 3 semester hours. Dynamic response and control of chemical process equipment such as reactors, heat exchangers, distillation columns. Use is made of fundamental techniques of servomechanism theory such as block diagrams, transfer functions, and frequency response, stability analysis and control loop design. Unsteady state modeling and computer simulation of simple control systems.
Prerequisites:	Senior standing in the Chemical Engineering major. CHEG 3063 and MATH 4173.
Co-requisites:	None
Required Text(s):	None
Recommended Text(s):	1. “Process Control”, Bequette, W. B., Fifth Edition to First edition, Prentice Hall (2002). 2. “Process Dynamic and Control”, Seborg, D. E., Edgard, T. F., and Mellicamp, D. A., First edition or later, John Wiley and Sons (1989).

General Course Information Table

Student Learning Outcomes:

Upon successful completion of this course, students will be able to:	Program Learning Outcome Alignment	Core Curriculum Outcome Alignment
To develop competence and confidence in using and designing analog controllers and sensors for safe operation of industrial and laboratory processes.	D2	1

To develop conceptual understanding of the mechanisms which control fluid flow, level, heat transfer, and mass transfer processes.	D2	7
To develop understanding of modeling and simulation of industrial processes.	D2	1
To develop competence in solving practical control problems used in industrial processes.	D2	7

Student Learning Outcomes Table

ABET OUTCOMES:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The two performance criteria used to assess this outcome consist of

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Students are able to:

- (i) Identify and formulate dynamic industrial processes
- (ii) Solve problems describing functioning of dynamic systems
- (iii) Identify, formulate, and solve problems describing typical industrial control systems

7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies Students are able to:

- (i) Use new learning media, including videos and reading materials.
- (ii) Demonstrate proficiency in using remote learning tools.
- (iii) Analyze a control task and propose an adequate control strategy.

Major Course Requirements

Method of Determining Final Course Grade

Course Grade Requirement	Value	Total
1. Homeworks, Quizzes, Miniprojects (7)	variable	30% of course grade
2. Partial Exams (3) One can dropped.	20% of course grade	40% of course grade
3. Final Exam (1)	30% of course grade	30% of course grade
Total:		100%

Course Grade Requirement Table

Grading Criteria and Conversion:

A = 89 – 100 points

B = 79 – 88 points

C = 60 – 78 points

F = 59 or below

A signifies that the student has excellent knowledge of all concepts covered and acquired excellent skills.
B signifies that the student has good knowledge of all concepts covered and acquired good skills.
C signifies that the student has basic knowledge of all concepts covered and acquired basic skills.
F signifies that the student has insufficient knowledge of all concepts covered and failed to acquire basic skills.

Course Procedures or Additional Instructor Policies

Taskstream

Taskstream is a tool that Prairie View A&M University uses for assessment purposes. One of your assignments may be required to be submitted as an "artifact," an item of coursework that serves as evidence that course objectives are met. If applicable, more information will be provided during the semester by your department, but for general information, you can visit Taskstream via the link in eCourses.

Tests & Testing Policy

All tests are closed book and closed notes. Make-up exams are only available for students with university excused absences. In most cases, the make-up exam is given BEFORE the student misses the exam. Notification previous to exam IS required. No electronic devices will be allowed including iPads and eReaders. No graphing or programmable calculators are allowed for any test or quiz. Students must purchase a small scientific calculator to use on exams. A cell phone cannot be used as a replacement for a calculator on an exam. Doing so will result in a zero. No bathroom breaks are allowed during a test. If a student leaves the room during this time, their exam/quiz will be collected and considered finished by the student. Any act of cheating will result in a grade of zero for that student, and the student will be referred to the department head. Such meetings must take place within a week of the violation.

Homework Policy & Guidelines

This course involves the usage of computer software. Students must submit these assignments BEFORE the beginning of class. If a student chooses to disobey the university's honor code and copy the solution manual instead of submitting the student's own independent work, the student will receive a grade of zero on the assignment and will be referred to the department head. Such meetings must take place within a week of the infraction. Homework is due at the beginning of the class period. Late homework assignments will NOT be accepted!

Class Activities And Participation

Students are expected to attend scheduled classes on a regular basis and are expected to participate in classroom discussions. Required safety course can be made up only on justified excuses.

Class lab. activities are mandatory for this course. ***There is not possible to makeup a class activity.***

Semester Calendar

Modules	Topic	Online Assignment/Activity (Due Date)	Assignment/ Activity (Face-to-Face[F2F])
August 24, 2020	Course Introduction; Review of Syllabus;	- Read the syllabus (August 24, 2020) - ZOOM Questions and answers - Complete the syllabus quiz (August 24, 2020)	None
Module 1: August 26, 2020	Introduction	- Watch Utube Video - Read handout - ZOOM lectures - Complete quiz (August 26, 2020)	None
Module 2: August 31 - September 2, 2020	Modeling and Simulation of Dynamic Systems	- Watch Utube Video - Read handout - ZOOM lectures	None
Module 2: September 9, 2020 (September 7, holyday)	Modeling and Simulation of Dynamic Systems	- Watch Utube Video - Read handout - ZOOM lectures - Complete quiz (September 9, 2020)	None
Module 2: September 14 - 16, 2020	Modeling and Simulation of Dynamic Systems	- Watch Utube Video - Read handout - ZOOM lectures	None
F2F Partial Test September 21-23, 2020	1 st Partial Test	ZOOM questions and answers	- Problem section - Test (September 23, 2020)
Module 3: September 28 – 30, 2020	Laplace Transform	- Watch Utube Video - Read handout - ZOOM lectures	None
Module 3: October 5 – 7, 2020	Laplace Transform	ZOOM lectures	None

Modules	Topic	Online Assignment/Activity (Due Date)	Assignment/ Activity (Face-to-Face[F2F])
		Complete quiz (October 7, 2020)	
Module 4: October 12 – 14, 2020	Block Diagrams and Transfer Functions	- Watch Utube Video - Read handout - ZOOM lectures	None
Module 4: October 19 – 21, 2020	Block Diagrams and Transfer Functions	- ZOOM lectures - Complete quiz (October 21, 2020)	None
F2F Partial Test October 26 - 28 , 2020	2 nd Partial Test	ZOOM questions and answers	- Problem section - Test (October 28, 2020)
Module 5: November 2 – 4, 2020	Proportional, Integral and Derivative Control	- Watch Utube Video - Read handout - ZOOM lectures	None
Module 5: November 9 – 11, 2020	Proportional, Integral and Derivative Control	- ZOOM lectures - Complete quiz (November 11, 2020)	None
Module 6: November 16 – 18, 2020	Controller Tuning	- Watch Utube Video - Read handout - ZOOM lectures - Quiz (November 18, 2020)	None
F2F Partial Test November 23 – 25, 2020	3 rd Partial Test	ZOOM questions and answers	- Problem section - Test (November 24, 2020)
F2F Final Exam November 30, 2020	Final Exam	ZOOM questions and answers	- Problem section - Test (November 30, 2020)

Student Support and Success

John B. Coleman Library

The library and its partners have as their mission to provide resources and instructional material in support of the evolving curriculum, as a partner in Prairie View A&M University's mission of teaching, research, and service and to support the University's core values of access and quality, diversity, leadership, relevance, and social responsibility through emphasis on ten key areas of service. It maintains library collections and access both on campus, online, and through local agreements to further the educational goals of students and faculty. Phone: 936-261-1500; Website: [J. B. Coleman Library](#).

Academic Advising Services

Academic Advising Services offers students a variety of services that contributes to student success and leads towards graduation. We assist students with understanding university policies and procedures that affect academic progress. We support the early alert program to help students get connected to success early in the semester. We help refer students to the appropriate academic support services when the student is unsure of the best resource for their needs. Some students are supported by faculty advisors in their respective colleges. Your faculty advisor can be identified in PantherTracks. Advisors with Academic Advising Services are available to all students. We are located across campus. You can find your advisor's location by academic major at the [Academic Advising Website](#), Phone: 936-261-5911.

The University Tutoring Center

The University Tutoring Center (UTC) offers free tutoring and academic support to all registered PVAMU students. The mission of the UTC is to help provide a solid academic foundation that enables students to become confident, capable, independent learners. Competent and caring staff and peer tutors guide students in identifying, acquiring, and enhancing the knowledge, skills, and attitudes needed to reach their desired goals. Tutoring and academic support is offered face-to-face in the [UTC, in virtual face-to-face sessions](#), and through [online sessions at PVPlace](#). Other support services available for students include Supplemental Instruction, Study Break, Academic Success Workshops, and Algebra Study Jam. Location: J. B. Coleman Library, Rm. 307; Phone: 936-261-1561; Email: pvtutoring@pvamu.edu; Website: [University Tutoring Center](#).

The Writing Center

The Writing Center provides well-trained peer tutors that assist students with writing assignments at any stage of the writing process. Tutors help students with various writing tasks from understanding assignments, brainstorming, drafting, revising, editing, researching, and integrating sources. Students have free access to Grammarly online writing assistance. Grammarly is an automated proofreading and plagiarism detection tool. Student must register for Grammarly by using their student email address. In addition, students have access to face-to-face as well as virtual tutoring services either asynchronously via email or synchronously via Zoom. Location: J. B. Coleman Library, Rm. 209; Phone: 936-261-3724; Website: [The Writing Center](#); [Grammarly Registration](#).

Academic Early Alert

Academic Early Alert is a proactive system of communication and collaboration between faculty, academic advisors, and PVAMU students that is designed to support student success by promptly identifying issues and allowing for intervention. Academic Early Alert helps students by providing a central location to schedule advising appointments, view advisor contact information, and request assistance. Students who recognize that they have a problem that is negatively affecting

their academic performance or ability to continue school may self-refer an Academic Early Alert. To do so, students will log in to PVPlace and click on Academic Early Alert on the left sidebar. Phone: 936-261-5902; Website: [Academic Early Alert](#).

Student Counseling Services

The Student Counseling Services unit offers a range of services and programs to assist students in maximizing their potential for success: short-term individual, couples, and group counseling, as well as crisis intervention, outreach, consultation, and referral services. The staff is licensed by the State of Texas and provides assistance to students who are dealing with academic skills concerns, situational crises, adjustment problems, and emotional difficulties. Information shared with the staff is treated confidentially and in accordance with Texas State Law. Location: Hobart Taylor, 2nd floor; Phone: 936-261-3564; Website: [Student Counseling Services](#).

Office of Testing Services

Testing Services serves to create opportunities by offering suite of exams that aid in the students' academic and professional success. Currently we administer entrance (HESI A2), college readiness (TSI assessment), Prior Learning (CLEP, DSST), and proctored exams. Location: Wilhelmina Delco, 3rd Floor, Rm. 305; Phone: 936-261-3627; Email: aetesting@pvamu.edu; Website: [Testing Services](#).

Office of Diagnostic Testing and Disability Services

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, contact the Office of Disability Services. As a federally-mandated educational support unit, the Office of Disability Services serves as the repository for confidential disability files for faculty, staff, and students. For persons with a disability, the Office develops individualized ADA letters of request for accommodations. Other services include: learning style inventories, awareness workshops, accessibility pathways, webinars, computer laboratory with adapted hardware and software, adapted furniture, proctoring of non-standardized test administrations, ASL interpreters, ALDs, digital recorders, livescribe, and a comprehensive referral network across campus and the broader community. Location: Hobart Taylor, Rm. 1D128; Phone: 936-261-3583; Website: [Disability Services](#).

Center for Instructional Innovation and Technology Services (CIITS)

Distance Learning, also referred to as Distance Education, is the employment of alternative instructional delivery methods to extend programs and services to persons unable to attend college in the traditional manner. The Center for Instructional Innovation and Technology Services (CIITS) supports student learning through online, hybrid, web-assisted and 2-way video course delivery. For more details and contact information, visit: [CIITS Student Webpage](#); Phone: 936-261-3283.

Veteran Affairs

Veteran Services works with student veterans, current military and military dependents to support their transition to the college environment and continued persistence to graduation. The Office coordinates and certifies benefits for both the G.I. Bill and the Texas Hazlewood Act. Location: Evans Hall, Rm. 102; Phone: 936-261-3563; Website: [Veteran Affairs](#).

Office for Student Engagement

The Office for Student Engagement delivers comprehensive programs and services designed to meet the co-curricular needs of students. The Office implements inclusive and accessible programs and services that enhance student development through exposure to and participation in diverse and relevant social, cultural, intellectual, recreational, community service, leadership development and campus governance. Location: Memorial Student Center, Rm. 221; Phone: 936-261-1340; Website: [Office for Student Engagement](#).

Career Services

Career Services supports students through professional development, career readiness, and placement and employment assistance. The Office provides one-on-one career coaching, interview preparation, resume and letter writing, and career exploration workshops and seminars. Services are provided for students at the Northwest Houston Center and College of Nursing in the Medical Center twice a month or on a requested basis. Distance Learning students are encouraged to visit the Career Services website for information regarding services provided. Location: Anderson Hall, 2nd floor; Phone: 936-261-3570; Website: [Career Services](#).

University Rules and Procedures

Academic Misconduct (See Student Planner)

You are expected to practice academic honesty in every aspect of this course and all other courses. Make sure you are familiar with your Student Planner, especially the section on academic misconduct (see *University Administrative Guidelines on Academic Integrity*). Students who engage in academic misconduct are subject to university disciplinary procedures. As listed in the PVAMU Undergraduate Catalog, Graduate Catalog, and the Student Planner, the following are examples of prohibited conduct. This list is not designed to be all-inclusive or exhaustive. In addition to academic sanctions, any student found to have committed or to have attempted to commit the following academic misconduct may also be subject to disciplinary review and action as outlined in the PVAMU Student Planner.

Forms of Academic Dishonesty:

1. Cheating: Deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not learned, giving or receiving aid unauthorized by the instructor on assignments or examinations. Examples: unauthorized use of notes for a test; using a “cheat sheet” on a quiz or exam; any alteration made on a graded test or exam which is then resubmitted to the teacher.
2. Plagiarism: Careless or deliberate use of the work or the ideas of another; representation of another’s work, words, ideas, or data as your own without permission or appropriate acknowledgment. Examples: copying another’s paper or answers, failure to identify information or essays from the Internet and submitting or representing it as your own; submitting an assignment which has been partially or wholly done by another and claiming it as yours; not properly acknowledging a source which has been summarized or paraphrased in your work; failure to acknowledge the use of another’s words with quotation marks.

3. Multiple Submission: Submission of work from one course to satisfy a requirement in another course without explicit permission. Example: using a paper prepared and graded for credit in one course to fulfill a requirement and receive credit in a different course.
4. Conspiracy: Agreeing with one or more persons to commit an act of academic/scholastic dishonesty.
5. Fabrication of Information/Forgery: Use or submission of contrived, invented, forged, or altered information in any assignment, laboratory exercise, or test; tampering with or production of a counterfeit document, particularly documents which make up the student's academic record. Examples: making up a source or citing nonexistent publication or article; representing made up data as real for an experiment in a science laboratory class; forging a change of grade or student withdrawal record; falsifying any document related to a student academic exercise.

Nonacademic Misconduct (See Student Planner)

The University respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with either (1) the instructor's ability to conduct the class, or (2) the ability of students to benefit from the instructional program, or (3) the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated by the Office for Student Conduct under nonacademic procedures.

Sexual Misconduct

Sexual harassment of students and employees at Prairie View A&M University is unacceptable and will not be tolerated. Any member of the university community violating the university's sexual harassment policy will be subject to disciplinary action. In accordance with the Texas A&M University System guidelines, your instructor is obligated to report to the Office of Title IX Compliance (titleixteam@pvamu.edu) any instance of sexual misconduct involving a student, which includes sexual assault, stalking, dating violence, domestic violence, and sexual harassment, about which the instructor becomes aware during this course through writing, discussion, or personal disclosure. The faculty and staff of PVAMU actively strive to provide a learning, working, and living environment that promotes respect that is free from sexual misconduct, discrimination, and all forms of violence. If students, faculty, or staff would like assistance, or have questions, they may contact the Title IX Coordinator at 936-261-2144 or titleixteam@pvamu.edu. More information can be found at the [Title IX Webpage](#) including confidential resources available on campus.

Pregnancy, Pregnancy-related, and Parenting Accommodations

Title IX of the Education Amendments of 1972 prohibits sex discrimination, which includes discrimination based on pregnancy, marital status, or parental status. Students seeking accommodations related to pregnancy, pregnancy-related condition, or parenting (reasonably immediate postpartum period) are encouraged to contact Student Disability Services or the Dean of Students' Office for additional information and to request accommodations. More information can be found at this [webpage](#).

Non-Discrimination Statement

Prairie View A&M University does not discriminate on the basis of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, sexual orientation or gender identity in its programs and activities. The University is committed to supporting students and

complying with the Texas A&M University System non-discrimination policy. It seeks to establish an environment that is free of bias, discrimination, and harassment. If you experience an incident of discrimination or harassment, we encourage you to report it. If you would like to speak with someone who may be able to afford you privacy or confidentiality, there are individuals who can meet with you. The Director of Equal Opportunity & Diversity has been designated to handle inquiries regarding the non-discrimination policies, and can be reached at Harrington Science Building, Suite 109 or by phone 936-261-1744 or 1792.

Class Attendance Policy (See Catalog for Full Attendance Policy)

Prairie View A&M University requires regular class attendance. Attending all classes supports full academic development of each learner whether classes are taught with the instructor physically present or via distance learning technologies such as interactive video and/or internet. Excessive absenteeism, whether excused or unexcused, may result in a student's course grade being reduced or in assignment of a grade of "F". Absences are accumulated beginning with the first day of class during regular semesters and summer terms. Each faculty member will include the University's attendance policy in each course syllabus.

Student Academic Appeals Process

Authority and responsibility for assigning grades to students rests with the faculty. However, in those instances where students believe that miscommunication, errors, or unfairness of any kind may have adversely affected the instructor's assessment of their academic performance, the student has a right to appeal by the procedure listed in the University Catalog and by doing so within thirty days of receiving the grade or experiencing any other problematic academic event that prompted the complaint. Students can file Academic Complaints and/or Grade Appeals at this [webpage](#).

Technical Considerations

Minimum Recommended Hardware and Software:

- Intel PC or Laptop with Windows 10 or later version; Mac with OS High Sierra*
- Smartphone or iPad/Tablet with Wi-Fi*
- High speed Internet access
- 8 GB Memory
- Hard drive with 320 GB storage space
- 15" monitor, 800x600, color or 16 bit
- Sound card w/speakers
- Microphone and recording software
- Keyboard & mouse
- Most current version of Google Chrome, Safari or Firefox

*Smartphone, Google Chrome books and Android tablets may not be supported. iPads are the only tablets supported.

Note: Be sure to enable Java & pop-ups in the Web browser preferences

Participants should have a basic proficiency of the following computer skills:

- Sending and receiving emails
- A working knowledge of the Internet
- Microsoft Word (or a program convertible to Word)
- Acrobat PDF Reader

- Windows or Mac OS
- Video conferencing software

Netiquette (online etiquette)

Students are expected to participate in all discussions and virtual classroom chats as directed. Students are to be respectful and courteous to others on discussions boards. Foul or abusive language will not be tolerated. Do not use ALL CAPS for communicating to others AS IT CAN BE INTERPRETED AS YELLING. Avoid slang terms such as “wassup?” and texting abbreviations such as “u” instead of “you.” Limit and possibly avoid the use of emoticons. Be cautious when using humor or sarcasm as tone is sometimes lost in an email or discussion post and the message might be taken seriously or sound offensive.

Video Conferencing Etiquette

When using Zoom, WebEx or other video conferencing tools, confirm the visible area is tidy, clear of background clutter, inappropriate or offensive posters, and other distractions. Ensure you dress appropriately and avoid using high traffic or noisy areas. Stay muted when you are not speaking and avoid eating/drinking during session. Before class session begins, test audio, video and lighting to alleviate technology issues.

Technical Support

Students should go to the [Password Reset Tool](#) if they have password issues. The page will provide instructions for resetting passwords and contact information if login issues persist. For other technical questions regarding eCourses, call the Center for Instructional Innovation and Technology Services (CIITS) at 936-261-3283 or email ciits@pvamu.edu.

Communication Expectations and Standards

Emails or discussion postings will receive a response from the instructor, usually in less than 48 hours. Urgent emails should be marked as such. Check regularly for responses.

Discussion Requirement

Online courses often require minimal to no face-to-face meetings. However, conversations about the readings, lectures, materials, and other aspects of the course can take place in a seminar fashion. This will be accomplished by the use of the discussion board. The exact use of discussion will be determined by the instructor.

It is strongly suggested that students type their discussion postings in a word processing application such as Word and save it to their PC or a removable drive before posting to the discussion board. This is important for two reasons: 1) If for some reason your discussion responses are lost in your online course, you will have another copy; 2) Grammatical errors can be greatly minimized by the use of the spell-and-grammar check functions in word processing applications. Once the post(s) have been typed and corrected in the word processing application, copy and paste to the discussion board.

COVID-19 Campus Safety Measures

To promote public safety and protect students, faculty, and staff during the COVID-19 pandemic, Prairie View A&M University has adopted policies and practices for the Fall 2020 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- **Self-monitoring** - Students should follow CDC recommendations for self-monitoring. Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely and should not participate in face-to-face instruction.
- **Face Coverings** - Face coverings (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain.
- **Physical Distancing** - Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- **Classroom Ingress/Egress** - Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Students should leave classrooms promptly after course activities have concluded, should not congregate in hallways and should maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- **Face-to-face Class** - To attend a face-to-face class, students must wear a face covering (or a face shield if they have an exemption letter). If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the Office for Student Conduct for adjudication. Additionally, the faculty member may choose to teach that day's class remotely for all students
- **COVID-19 Guidelines for Student Conduct Adjudication** - The mandatory COVID-19 Training/Certification taken by all students serves as the 1st Warning for violation of COVID-19 Guidelines.
 - 1st incident: upon review of Incident Report and finding of responsibility — Conduct Probation
 - 2nd incident: upon review of Incident Report and finding of responsibility — Suspension
 - Consult the Code of Student Conduct in the Student Planner or [Student Conduct website](#) for additional information on Conduct Probation and Suspension.
- **Personal Illness and Quarantine** - Students required to quarantine must participate in courses and course-related activities remotely and must not attend face-to-face course activities. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities. Students experiencing personal injury or illness that is too severe for the student to attend class qualify for an excused absence. To receive an excused absence, students must provide appropriate documentation to the Office for Student Conduct, studentconduct@pvamu.edu.

End of Semester Course Assessment Report

This summary contains the following Information

1. Performance Statistics

- Total number of students in class
- The class average performance (**stated as %**) in each course outcome assessed in this class and the **two previous times course was assessed**.
- The acceptable class average for the class in each outcome area as set by your Department. **You cannot use any number of your choice**
- Percentage of students who scored below the expected average in each outcome.

2. Implementation Summary

- Brief summary of plans implemented during the semester based on last assessment report

3. Perceived Problems

- Instructor's **critical evaluation** of perceived problems that affected students' performance. **Realistic problems should be identified throughout the semester and summarized in this section of the report.**

4. New Plans for Addressing Problems

- Instructor's plans for addressing the perceived problems the next time the class is taught. **These should be specific enough for another instructor to implement. Most of these should be things that, you, the instructor can implement to help students to improve. Be creative.**

5. Overall Trend over last three assessment periods

- Instructors summary of overall performance trend for each outcome measured over the last three periods.

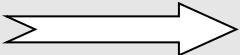
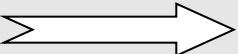
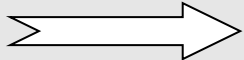
5. Were Expectations Met?

- Answer **YES** if the **class average was above the expected average** and the **stated percentage of students** scored at or above the expected average, else answer NO.

END OF SEMESTER COURSE OUTCOME ASSESSMENT REPORT
CHEG4303-Y01 Process Control
Fall 2021 SEMESTER

Report Prepared by: Dr. Jorge Gabitto

Report Date: December 20, 2021

Semester	Analysis Type	Number of Students	Outcome 1 An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.			Outcome 7 Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice		
			Expected Average	Class Average	% Students Meeting Expected Average	Expected Average	Class Average	% Students Meeting Expected Average
Fall 2021	Direct	25	75	78.8	68.0	75	75.0	68.0
Fall 2020	Direct	32	75	87.0	81.3	75	81.7	78.2
Fall 2019	Direct	41	75	91.6	96.9	75	85.8	84.4
Implementation Summary			Class discussion about problem solving techniques. Strong emphasis on procedures discussed in class. Informal problems given that concentrated on solving techniques.			Class discussion about computer techniques and use of spread-sheets. Strong emphasis on procedures discussed in class.		
Perceived Problems			Students could not conceptualize, identify the physical laws, and analyze problems that are different from an example problem they have seen before. The availability of a tutor will help. Tutoring on advance math could also help. Computer learning assignments helped to produce some improvement.			Students were not familiar with use of MatLab and appropriate computer software. Influence of the Covid-19 pandemic noticed. Problems with remote classes also noticed.		
Plans for Addressing Problems			The instructor should: 1. The instructor reduce the time spent on giving notes on the board by making copies of notes for students, it is recommended that this be continued in subsequent semesters. 2. Need to continue providing tutoring assistance to interested students. 3. More problem sections to be offered.			The instructor should: 1. The instructor introduced new examples in class. 2. Need to provide tutoring assistance to interested students.		

Overall Trend over Periods		Students' performance was above average. There was a decrease compared to previous semesters. Improvement is needed.	Students' performance was average. However, there was a decrease in performance with respect to previous semesters. Need more work on improvement plan.

**Grade Sheet Showing
Student and Class Performance in Outcomes**

**CHEG 4303-Y01
FALL 2021 SEMESTER**

Outcome 1

1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome 7

1) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. problems by applying principles of engineering, science, and mathematics

HW 3 + Test 3

Test 1 + HW 4

Student 1	8.6	1	9.5	1
Student 2	8.25	1	7.4	<u>1</u>
Student 3	8.25	1	5	
Student 4	9.25	0	4.75	
Student 5	7	0	7	
Student 6	9	1	7.25	
Student 7	8	1	8.35	<u>1</u>
Student 8	8	1	7.35	<u>1</u>
Student 9	7.75	1	7	
Student 10	9	1	9.25	<u>1</u>
Student 11	7.55	1	8.1	<u>1</u>
Student 12	7.25	0	8.35	<u>1</u>
Student 13	7.9	1	8	<u>1</u>
Student 14	7	0	7.6	<u>1</u>
Student 15	8.4	1	8.75	<u>1</u>
Student 16	8.5	1	7.5	<u>1</u>
Student 17	9	1	10	<u>1</u>
Student 18	5.5	0	2.95	
Student 19	8.5	1	3.8	

Student 20	6.5	0	4.15	
Student 21	8.25	1	7.85	<u>1</u>
Student 22	8.75	1	9.85	<u>1</u>
Student 23	8	1	10	<u>1</u>
Student 24	7.1	0	9.6	<u>1</u>
Student 25	5.65	0	8.1	<u>1</u>
	196.95	17	187.45	<u>17</u>
	7.878	0.68	7.498	0.68

**OUTCOME SPECIFIC ASSIGNMENTS
USED TO ASSESS OUTCOMES**

ASSIGNMENTS FOR OUTCOME 1

An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

**CHEMICAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET**

Process Control

FALL 2021

Instructor: Dr. Jorge F. Gabitto

Title of Assignment

Homework 3

Outcome Measured Using this Assignment

Outcome 1

An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Brief justification of why this assignment is suitable for this outcome

The rubric used for grading this assignment measures the students' ability to identify, solve, and formulate engineering problems. It applies Laplace domain analysis of transient behavior of complex systems.

CHEG 4033
3rd HomeWork

1). Calculate the Laplace equivalent of the following equations:

- A step of size Du
- A pulse of integral P
- $\sin(\omega t)$
- $\frac{dT}{dt} = K_p u$

2). Calculate the Laplace equivalent of the following equations:

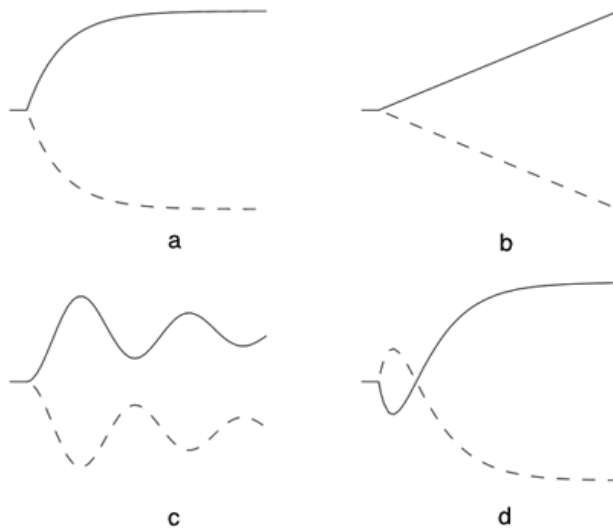
$$K_p \frac{dT}{dt} = (u_1 - T) + u_2 A + u_3 B,$$

where T is the output variable, A and B are constants and u_1 , u_2 and u_3 are the deviations variables for the input temperature (Ti), input flow (Fi) and input heat flow (QF), respectively.

$$K_p \frac{d^2T}{dt^2} + \frac{dT}{dt} A = (u_1 - T) + u_2 B + \frac{du_3}{dt},$$

where T is the output variable, A, B, and C are constants and u_1 , u_2 and u_3 are the deviations variables for the input temperature (Ti), input flow (Fi) and input heat flow (QF), respectively.

3). Describe qualitatively the following dynamic responses to a step in the input variable:



Hint: Analyze response at short times, functional description, and convergence of the eight systems shown above, 4 given by solid lines and 4 given by broken lines.

1ke

$$2. T_p \frac{dT}{ds} = (u_1 - \bar{T}) + u_2 A + u_3 B$$

$$L(T_p \frac{dT}{ds}) = L((u_1 - \bar{T}) + u_2 A + u_3 B)$$

$$T_p sT(s) - T(0) = T_1(s) - \bar{T}(s) + A F_i(s) + B Q_F(s)$$

$$T(0) + T_p sT(s) - T_1(s) + A F_i(s) + B Q_F(s)$$

$$T(0) (1 + T_p s) T_i(s) + A F_i(s) + B Q_F(s)$$

$$T(0) = \frac{T_1(s) + A F_i(s) + B Q_F(s)}{1 + T_p(s)}$$

Ike Anaghara

3.

a) Solid - Direct, monotonic, convergent
Dotted - Reverse, monotonic convergent

b) Solid - Direct, monotonic, convergent
Dotted - Reverse, monotonic, convergent

c) Solid - Direct, oscillatory, convergent
Dotted - Reverse, oscillatory, convergent

d) Solid - Reverse π , monotonic, converge
Dotted - Reverse π , monotonic, converge

1ke

1

• A step of size D_u : $\mathcal{L}[D_u] = \frac{D_u}{s}$

• A pulse of integral: $\mathcal{L}\left[\int_0^t P dt\right] = \frac{P}{s^2}$

• $\sin(\omega t)$: $\mathcal{L}[\sin(\omega t)] = \frac{\omega}{s^2 + \omega^2}$

• $\frac{dT}{dt} = k_p U$: $\mathcal{L}\left[\frac{dT}{dt}\right] = \mathcal{L}[k_p U]$

$$sT(s) = k_p U(s)$$

WATCH

**CHEMICAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET**

Process Control

FALL 2021

Instructor: Dr. Jorge F. Gabitto

Title of Assignment

Test 3

Outcome Measured Using this Assignment

Outcome 1

An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Brief justification of why this assignment is suitable for this outcome

The rubric used for grading this assignment measures the students' ability to identify, solve, and formulate engineering problems. It applies Laplace domain analysis and algebraic manipulations to determination of transient behavior of complex systems.

CHEG 4303
Process Control
3rd Exam A

1). Calculate for the simplified two block (process and controller) block diagram the response to a negative step change ($-2/s$) if the controller is a PI. Calculate the long term value. Plot the response.

Use: $G_{ca}(s) = (0.5/s + 1)$, $G_{sys}(s) = 2 / (5s + 1)$.

2). Calculate the qualitative behavior of a closed control loop that has the following roots:

Zeros (top): $z_1 = -0.5$, $z_2 = -0.2$,

Poles (bottom): $p_1 = -1$, p_2 and p_3 are complex numbers with **real part** = -2 and imaginary parts = 3 and -3 , respectively. Justify and plot the response.

$$(1) G_{total} = \frac{G_{CA} G_{sys}}{1 + G_{CA} G_{sys}}$$

Calculate for simple
2 block diagram
- response
- long term value

$$G_{CA} = (1/s + 0.5s + 1) \quad \text{--- } (K_P)$$

$$G_{sys} = 2 / (s + 1) \quad \text{or}$$

$$\frac{2}{(s + 1)} \quad \begin{matrix} \text{--- } (K_{sys}) \\ \text{--- } (T_{sys}) \end{matrix}$$

a) Dynamiz Behavior
- closed control loop
- use G_{total}

$$1) G_{CA} \times G_{sys} = (1/s + 0.5s + 1) \times \left(\frac{2}{(s + 1)} \right)$$

$$= \frac{\frac{2}{s} + 1s + 2}{(s + 1)}$$

$$G_{Total} = \frac{\frac{2}{s} + 1s + 2}{s + 1}$$

$$\frac{(s + 1)}{(s + 1)} \times 1 + \frac{\frac{2}{s} + 1s + 2}{s + 1}$$

$$\frac{\frac{2}{s} + 1s + 2}{s + 1}$$

$$\frac{s + 1 + \frac{2}{s} + 1s + 2}{s + 1} \quad [G_{Total}]$$

$$= \frac{\frac{2}{s} + 1s + 2}{s + 1 + \frac{2}{s} + 1s + 2}$$

$$= \left[\frac{\frac{2}{s} + 1s + 2}{6s + \frac{2}{s} + 3} \right]$$

a) Direct / Reverse

Dynamic response

$$G_{CA} = (1/s + 0.5s + 1) \rightarrow \text{Direct}$$

- Constant; no root
- positive

b) real root

$$\text{Denominator} = 5s + 1 = 0$$

$$\frac{5s}{5} = \frac{-1}{5}$$

$$s = -1/5$$

real root

= monotonic
or
Non-oscillatory

c) convergent + Divergent

$$s < 0 \text{ (All)} \Rightarrow \text{convergent (Stable)}$$

Plot

Direct, monotonic, Convergence



values? Long term + Short Term

$$U(s) = \frac{1}{s} \text{ (Step of value)}$$

$$= s \times G_{\text{total}} \times \overline{U}(s) =$$

$$= \cancel{s} \times \left[\frac{\frac{2}{\cancel{s}} + \cancel{1}s + 2}{6\cancel{s} + \frac{2}{\cancel{s}} + 3} \right] \times \frac{1}{\cancel{s}} = \boxed{\frac{\frac{2}{s} + 1s + 2}{6s + \frac{2}{s} + 3}}$$

$$\begin{array}{l} \text{long term lim} \\ s \rightarrow 0 \\ s=0 \end{array} \quad \frac{\frac{2}{\cancel{s}} + \cancel{1}s + 2}{6\cancel{s} + \frac{2}{\cancel{s}} + 3} = \boxed{\frac{2}{3}} \text{ long term value}$$


Jarred Essilima

Exam 3-E

2 Calculate the qualitative behavior of closed loop:

(a) short-term Behavior

Top: $z_1 = -0.5$, $z_2 = 0.2$

bottom: $p_1 = -1$

Reverse

$p_2 = (-2, 3)$

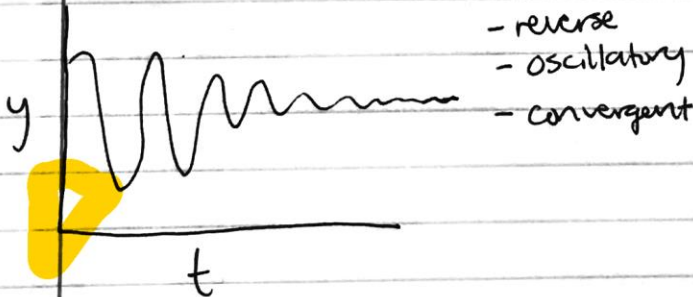
$p_3 = (-2, -3)$

real
imaginary

(b) Oscillatory $\begin{pmatrix} -2 \\ -2 \end{pmatrix}$ Functional Behavior of the output response.

(c) $-2 < 0 \Rightarrow$ Convergent Long-term Behavior

Plot



ASSIGNMENTS FOR OUTCOME 7

An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**CHEMICAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET
Chemical Engineering Laboratory III
SPRING 2021**

Instructor: Dr. Jorge F. Gabitto

Title of Assignment

Test 1

Outcome Measured Using this Assignment

Outcome 7

An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Brief justification of why this assignment is suitable for this outcome

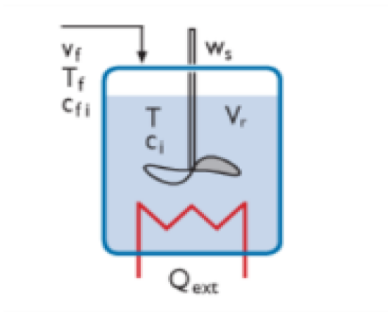
The rubric used to grade the report assesses the students use material and energy balances plus advance mathematical techniques to simulate dynamic behavior of complex engineering systems.

CHEG 4303
Process Control
1st Test A

1). Derive the transient model equations for filling a tank. Use: total mass balance (L). All parameters are constant.

2). Derive the transient model equations for a semi-batch reactor with a first order reaction, $A \rightarrow \text{Product}$. Use: mass balance for limiting reactant A (C_A).

Semi-batch reactor has only one input and no output. See diagram below, C_{fi} = input of the i-species, A in this case. Be careful that V_r changes with time. It is NOT constant.



Mohamed Nabil AKINOTCHU

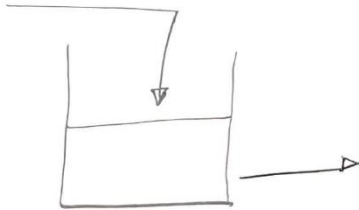
CHEG 4303

Process Control

1st Test A

10

1)



Property: mass of water
System: the TANK
Process: Continuous

In - out + generation $\rightarrow 0$ = Accumulation

$\Rightarrow$ In - out = Accumulation

$$\Rightarrow \dot{m}_{in} - \dot{m}_{out} = \frac{dm}{dt} = \rho \frac{dV}{dt} = \rho A_s \frac{dL}{dt}$$

We know that $\rho = \frac{m}{V} \Rightarrow m = \rho \cdot V$ then the equation becomes

$$\boxed{\rho_{in} V_{in} - \rho_{out} V_{out} = \rho A_s \frac{dL}{dt}}$$

✓ 4

We also know that

$$P = P_{in} = P_{out}$$

then

$$\frac{dL}{dt} = \frac{A}{A_s} (\dot{V}_{in} - \dot{V}_{out})$$

2) the mass balance equation is

$$\text{In} - \text{out} + \text{generation} = \text{Accumulation}$$

For a semi-batch reactor there is one input and no output



then:

$$\text{In} + \text{generation} = \text{Accumulation}$$

$$\dot{n}_A + R_A V_R = \frac{dn_A}{dt}$$

We know that $\dot{n}_A = V C_A$

$$R_A V_R = -k C_A \cdot V_R$$

the equation becomes

$$\dot{V}C_a^{in} - k C_a V_R = \frac{d(C_a \cdot V_R)}{dt} = V_R \frac{dC_a}{dt}$$

$$\dot{V}C_a^o - k C_a V_R = V_R \frac{dC_a}{dt}$$

because V_R changes with time our general equation is

$$\dot{V}C_a^o - k C_a \frac{dV_R}{dt} = \frac{d(C_a \cdot V_R)}{dt}$$



**CHEMICAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET**

Process Control

FALL 2021

Instructor: Dr. Jorge F. Gabitto

Title of Assignment

Homework 4

Outcome Measured Using this Assignment

Outcome 7

An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Brief justification of why this assignment is suitable for this outcome

The rubric used to grade the report assesses the students use Laplace domain analysis and eigenvalue calculations to determine dynamic behavior of complex feedback control loops.

CHEG 4033
4th Homework

1). Calculate the Laplace equivalent of the following equation:

$$\tau_p \frac{d^2 T}{dt^2} + \frac{dT}{dt} A = (u_1 - T) + B \frac{du_1}{dt},$$

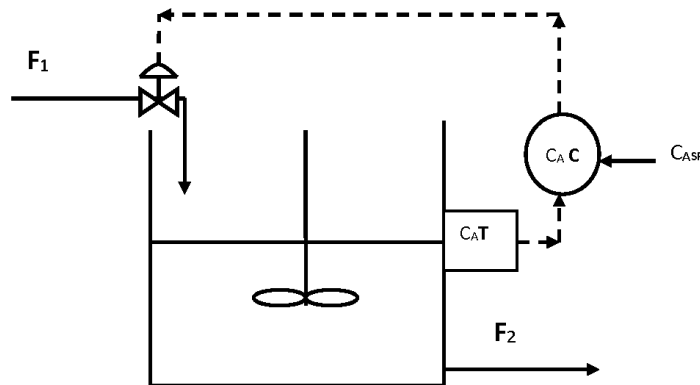
where T is the output variable, A , B , and τ_p are constants and u_1 is the deviation variable.

2). In a previous problem the following system transfer function has been obtained:

$$Y(s) = k / (\tau^2 s^2 + 2 \zeta \tau s + 1) U(s)$$

- Calculate the qualitative response to a positive impulse disturbance ($U(s) = P$).
- If k is positive comment on short time behavior.
- If ζ and τ are positive will the system oscillate? What kind of oscillations?
- Which is the value of the system long time respond? Same for short time.

3). Derive the appropriate control block flow diagram using the attached P&I D.



4). In a previous problem the following system transfer function has been obtained:

$$Y(s) = k / (\tau^2 s^2 + 2 \zeta \tau s + 1) U(s)$$

- Calculate the qualitative response to a positive step disturbance ($U(s) = \Delta U/s$).
- If τ is positive comment on stability.
- If ζ and τ are positive will the system oscillate? What kind of oscillations?
- Which is the system long time respond?

$$1) \tau_p \frac{d^2 T}{dt^2} + \frac{dT}{dt} A = (u_1 - T) + B \frac{du_1}{dt}$$

$$\Rightarrow \mathcal{L}\left[\tau_p \frac{d^2 T}{dt^2}\right] + \mathcal{L}\left[A \frac{dT}{dt}\right] = \mathcal{L}[u_1 - T] + \mathcal{L}\left[B \frac{du_1}{dt}\right]$$

$$\Rightarrow \tau_p s^2 T(s) + A s T(s) = u_1(s) - T(s) + B s u_1(s)$$

$$2) \gamma(s) = \frac{k}{\tau^2 s^2 + 2\zeta \tau s + 1} u(s)$$

$$u(s) = P \Rightarrow \gamma(s) = \frac{k \cdot P}{\tau^2 s^2 + 2\zeta \tau s + 1}$$

a, Qualitative response:

* $k < 0 \rightarrow$ reverse

$k > 0 \rightarrow$ direct

* Roots for denominator function

$$s_1 = \frac{-2\zeta\tau + \sqrt{4\zeta^2\tau^2 - 4\tau^2}}{2\tau^2} = \frac{-\zeta + \sqrt{\zeta^2 - 1}}{\tau}$$

$$s_2 = \frac{-\zeta - \sqrt{\zeta^2 - 1}}{\tau}$$

• If $-1 < \zeta < 1 \rightarrow$ oscillatory

• If $\zeta \geq 1$ or $\zeta < -1 \rightarrow$ monotonic

* If $\zeta \leq 0 \rightarrow$ divergent
 If $\zeta > 0 \rightarrow$ convergent } for $\tau > 0$

b, $k > 0 \rightarrow$ direct

c, $\zeta > 0, \tau > 0$

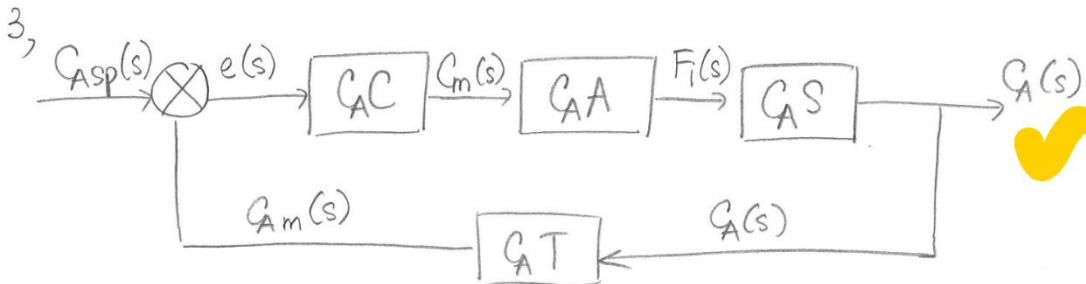
The system will oscillate if $0 < \zeta < 1$. It will be convergent oscillation

d, Long term response

$$\lim_{s \rightarrow 0} sY(s) = \lim_{s \rightarrow 0} \frac{skp}{\tau^2 s^2 + 2\zeta\tau s + 1} = \frac{0}{1} = 0$$

Short term response

$$\lim_{s \rightarrow \infty} sY(s) = \lim_{s \rightarrow \infty} \frac{skp}{\tau^2 s^2 + 2\zeta\tau s + 1} = \lim_{s \rightarrow \infty} \frac{kp}{\tau^2 s + 2\zeta\tau + \frac{1}{s}} = \frac{kp}{\infty} = 0$$



4, $Y(s) = \frac{k}{\tau^2 s^2 + 2\zeta\tau s + 1} U(s)$

$$U(s) = \frac{\Delta u}{s} \Rightarrow Y(s) = \frac{k}{\tau^2 s^2 + 2\zeta\tau s + 1} \frac{\Delta u}{s}$$

a, Qualitative response

* $k < 0 \rightarrow$ reverse

$k > 0 \rightarrow$ direct

* Roots for denominator function

$$s_1 = \frac{-\zeta + \sqrt{\zeta^2 - 1}}{\tau}$$

$$s_2 = \frac{-\zeta - \sqrt{\zeta^2 - 1}}{\tau}$$

If $-1 < \zeta < 1 \rightarrow$ oscillatory

If $\zeta > 1$ or $\zeta < -1 \rightarrow$ monotonic

* If $\zeta \leq 0 \rightarrow$ divergent
 $\zeta > 0 \rightarrow$ convergent } $\tau > 0$

b, $\tau > 0$, stability depends on $-\zeta \pm \sqrt{\zeta^2 - 1}$

$-1 < \zeta < 1 \rightarrow$ oscillatory

$\zeta < -1$ or $\zeta > 1 \rightarrow$ monotonic

c, The system will oscillate if $0 < \zeta < 1$. It will be convergent.

d, long term response

$$\lim_{s \rightarrow 0} sY(s) = \lim_{s \rightarrow 0} s \cdot \frac{k}{\tau^2 s^2 + 2\zeta\tau s + 1} \cdot \frac{\Delta u}{s} = k\Delta u$$