SE 5348 Modeling & Simulation

Course Syllabus (v02)

University of Texas at El Paso

Master of Science in Systems Engineering

Course Description

The use of models, simulations, and Model Based Systems Engineering (MBSE) to support lifecycle activities is covered. The course reviews essential characteristics for models, simulations, and MBSE as well as the relation among them. Some models for real-time systems such as Petri Nets and State Transitions Diagrams are discussed in detail as well as tools that support modeling and simulation. The course covers in detail the diagrams included in the Systems Modeling Language (SysML) such as Use Case Diagram, Requirements Diagram, Sequence Diagram, Block Definition Diagram, Internal Block Diagram, and the Parametric Diagram. Students make use of tools to create models and execute simulations. Students also use a tool that supports both SysML models and the MBSE approach.

By the end of this course, participants will be able to:

- Apply the concepts behind models, simulation, and MBSE
- Apply different types of models and simulations to understand, define, verify and validate systems
- Discuss the support that MBSE brings to Systems Engineering
- Analyze complex dynamic behavior of systems like concurrency, synchronization, and orthogonality
- Compare and contrast the models of the System Modeling Language
- Examine and apply SysML Requirements Diagrams
- Create formal specifications of dynamic behavior using Petri Net notation, State Charts, and State transition diagrams
- Create formal specifications of dynamic behavior using State charts and event and mode tables
- Create a system specification making use of the models in the System Modeling Language (SysML)
- Apply tools to create models and simulations
- Define the structure of the system using IBD, IBD, Package, Constraint blocks and Parametric diagrams

Course Content Summary (use hyperlink to jump to selected week)

SE 5348 Modeling & Simulation	
Refer to the calendar posted on Blackboard for specific assignment and test due dates	
Module 1 **Modeling, Simulation, and Model-Based Systems Engineering**	**Week 1**
	Week 2
	Week 3

SE 5348 Modeling & Simulation	
Module 2 **Petri Nets**	**Week 4**
Module 3 **State Transitions Diagrams - Tools**	**Week 5** **Week 6**
Module 4 **SysML Intro & Requirements Diagrams**	**Week 7** **Week 8**
Module 5 **SysML Structure Diagrams**	**Week 9** **Week 10**
Module 6 **SysML Behavior Diagrams**	**Week 11** **Week 12**
Module 7 **SysML Models & Execution with No Magic's Cameo Systems Modeler**	**Week 13** **Week 14**

Instructor

Mr. John Artus

Contact Information	
e-mail	jgartus@utep.edu
Online office hours	M, W, Th, Fr after 6pm Mountain Time Please email me to coordinate an appointment on Zoom
Video Class Meeting	**Tuesdays at 6pm Mountain Time** at **https://utep-edu.zoom.us/j/9343262905** Some exceptions may exist due to holidays, etc. Always check the course calendar to see exactly when the video class sessions will be held.

Note:

- *For course-related inquiries, students shall use the course Discussion Board by creating a new thread*
  - *If you need help understanding a concept, reach out to your fellow students first via Discussion Board*
  - *The first student that provides the definitive solution to an issue raised will earn 10 points each for the student needing the help and the student providing the first completely helpful solution*
  - *The student requesting help has to notify the instructor by email, indicating which other student provided the help needed*
  - *Any student can earn a maximum 40 extra credit points using this mechanism*
  - *Only serious problems will be considered by the instructor for earning points this way*
  - *Seriousness of the issue is up to the instructor to determine*
  - *If the student seeking help is unable to find the needed help via this mechanism, then please contact the instructor via email for the help needed*

- *For personal issues, contact the instructor by e-mail.*
- *If there are any work/life issues that prevent you from accomplishing assignments/tests, please let the instructor know with as much advance notice as possible via email*
    - *Students with legitimate work/life issues will be granted reasonable time to make up assignments, at the instructor's discretion*
    - *No students will be penalized for assignments/tests impacted by technical issues or instructor error*
    - *The best advise is to contact the instructor via email with any issues preventing you from accomplishing your work in this course*

Required Reading Material

You will need the following reading materials throughout this course:

- Lenny Delligatti. (2014). *SysML Distilled, A Brief Guide to the Systems Modeling Language.* First edition. Addison-Wesley
    - This e-book is available in the UTEP Library for you to access at:
        - https://lib.utep.edu/record=b4886686
        - You will have to log in with your UTEP credentials to access this e-book
        - If you need help with setting up Global VPN on your device, you should contact the Help Desk at 915-747-4357
    - This e-book is also available for download for free at
        - https://app.ute.edu.ec/content/4915-114-4-1-6-19/SysML%20Distilled_%20A%20Brief%20Guide%20-%20Lenny%20Delligatti.pdf
- International Council on Systems Engineering. (2015). *INCOSE systems engineering handbook: A guide for system life cycle processes and activities.* Fourth edition. Eds. Forsberg, K. Roedler, G., Walden, D. et. al. Hoboken, NJ: Wiley. (Please see the UTEP Library Guide for MSSE 5341 for instructions on creating an INCOSE account to download the handbook)
- CMMI Product Team. (2010). *CMMI for development. Version 1.3*. CMMI Institute. CMMIInstitute.com. (Please see the UTEP Library Guide for MSSE 5341 for instructions on obtaining this resource)
- BKCase. (2015). *Guide to the systems engineering body of knowledge (SEBoK).* SEBok Wiki. SeBokWiki.org. Version 2.2 (available from the SEBoK website)

Required Computer Software

You will need the following computer software during this course:

- Platform Independent Petri Net Editor (PIPE) 2.5 - See SE 5348 Home Page on Blackboard for download and installation instructions.
- MATLAB/Simulink Version R2021a - See SE 5348 Home Page on Blackboard for download and installation instructions.
- Cameo Systems Modeler Version 19.0 by No Magic. Distributed by UTEP. See SE 5348 Home Page on Blackboard for download and installation instructions.

Video Classroom

The instructor will deliver a video class once a week on the Wednesday of each week. The video class will be delivered based on the instructor's availability. Situations may prevent the instructor from delivering a video class during a given week. The instructor will attempt to give as much advance notice as possible when a video class will not be delivered. Student attendance is totally optional. The video class is made available for the student's benefit. It is suggested that you take advantage of the opportunity to bring questions to the class and have them answered by the instructor. For example, this is a good opportunity to ask questions about the reading material, the assignments, and the tests. The video classes will be recorded and posted on Blackboard for students to review as needed. Occasionally, the video class may be schedule on a day of the week other than Wednesday. Always check the course schedule posted on Blackboard to determine the current dates for scheduled course activities.

Student Resources

Student resources include the course textbooks and internet resources related to lectures for each Module, instructions for collaborative work, and links to the Library Guide, UTEP Bookstore, and UTEP technology support. The collaborative section in Blackboard identifies the teams and team members for this course. The student resources section is located in the Blackboard Home Page for this course.

Summary of Course Structure

Course content is provided in seven modules that are posted onto Blackboard on the Saturday before the beginning of each module (every two weeks). Each module will have a menu to guide participants through the content and identify discussion board postings and/or assignments/tests to be submitted to Blackboard. The first module provides course overview and objectives, facilitates attendee's introductions and team building, and discusses SE main concepts addressed in the course. The section titled "Detailed Course Description" lists the detailed activities for each module that you will be responsible for. The seven modules for this course are as follows:

Module Number	Module Name
1	Modeling, Simulation, and Model-based Systems Engineering
2	Petri Nets
3	State Transitions Diagrams - Tools
4	SysML Intro & Requirement Diagrams
5	SysML Structure Diagrams
6	SysML Behavior Diagrams
7	SysML Models & Execution in No Magic's Cameo System Modeler

Student Deliverables

Deliverables are assignments and tests that the student is responsible for delivering on time and with the required quality to earn points towards the desired grade. Full instructions on the requirements and due dates for assignments and for test taking will be included in Blackboard postings. The goal in delivering assignments is for the student to clearly demonstrate command of the knowledge gained/derived from class readings and assignments. The student should expect to convince the instructor, though the submitted assignments/tests, that the student has command of the knowledge

gained during the course. Students are responsible for delivering the following artifacts as part of this course.

Discussion Assignment

A Discussion Assignment is prepared by the student alone and submitted on the Thursday of each week. Occasionally, the Discussion Assignment may be due on a day of the week other than Thursday. Always check the course schedule posted on Blackboard to determine the current dates for assignment due dates. A set of instructions will be provided by the instructor for each assignment as part of the module. The instructions will indicate the dedicated sources of knowledge the student should pull from to develop the assignment response. The student is free to access any additional resources the student feels will support an argument being developed. In this case, the student is required to cite the source of any points made in the argument. The purpose of the discussion assignment is to open up a topic for class discussion. The Discussion Assignment submission will be shared with other students in the class. The idea is that other students can argue in support or against the argument made in the submitted assignment.

Discussion Reply Assignment

A Discussion Reply Assignment is prepared by the student alone and submitted on the Friday of each week. Occasionally, the Discussion Reply Assignment may be due on a day of the week other than Friday. Always check the course schedule posted on Blackboard to determine the current dates for assignment due dates. The student will choose a minimum of two discussion assignment submittals from other students to respond to. When responding to someone else's submissions, do not simply say "I agree with your point…." Agreeing is easy. If you wish to agree with a point, provide additional evidence to support why the point deserves further consideration. Disagreeing, and saying why you disagree is more difficult. Look for a student submission to comment on, pick submissions that you either agree or disagree with and then say why you agree or disagree, with evidence.

Individual Assignment

An Individual Assignment is prepared by the student alone and submitted on the Friday of each week. Occasionally, the Individual Assignment may be due on a day of the week other than Friday. Always check the course schedule posted on Blackboard to determine the current dates for assignment due dates. A set of instructions will be provided by the instructor for each assignment as part of the module. The instructions will indicate the dedicated sources of knowledge the student should pull from to develop the assignment response. The student is free to access any additional resources the student feels will support an argument being developed. In this case, the student is required to cite the source of any points made in the argument. The individual assignment submission will not be shared with other students in the class.

Group Assignments

A Group Assignment is developed by all members of a team equally, and submitted on the Sunday of each week. Occasionally, the Group Assignment may be due on a day of the week other than Sunday. Always check the course schedule posted on Blackboard to determine the current dates for assignment due dates. The instructor will provide instructions on what is expected of the group deliverable for each

Group Assignment. Some of the weekly group assignments will build up from previous week group assignments. The team will review the assignment for the week and decide on an equitable distribution of tasks to each team member.

The team will segregate the individual tasks to group members such that when the individual contributions are merged into the deliverable to be submitted. In the submission it will be clearly indicated which member of the group prepared which section(s) of the assignment.

Late Delivery

There is no such thing as late assignment delivery in this course. If an assignment is not submitted by the due date/time, the assignment will receive a zero score. Blackboard automatically indicates which assignments are late. Take care to observe the due date and due time. If an assignment is one second late, Blackboard will flag the assignment as late. Be sure to start your work sufficiently in advance of the due date/time in order to submit assignments on time.

It is the student's responsibility to notify the instructor with as much advance notice as possible when it is known that an assignment due date/time will be missed for legitimate reason.

Minimum Word Count

Most (if not all) individual and discussion assignments will come with a minimum word count requirement in the instructions. The purpose of the word count is to encourage the student to develop a fully thought-out response. Do not pack your discussions and arguments with fluff, filler, or nonsense just to meet the word count limit. Provide good, well-thought-out discussions, with good explanation of your argument points on technical merits. The instructor is a seasoned Systems Engineering professional. The instructor will not be swayed by nonsense arguments. The instructor will grade assignments based on the quality of the arguments provided by the student.

Plagiarism

Do not plagiarize. Credit all sources. It's perfectly OK to quote a source, as long as it is credited. But, if your whole argument is based on an extensive quote, you won't receive much credit for originality. Plagiarism will simply NOT be tolerated.

Syllabus Test

A test will be issued at the end of the first week of Module 1 to test the student's understanding of the rules of student conduct for this course. The test will be available to take starting on the first day of class. The test is due on Sunday at the end of the first week of the Module 1. The test is open book. The test must be taken by the due date/time or it receives a zero grade. There is no makeup opportunity for this test. The test covers the content of the syllabus related to rules of student conduct for this course. The test does not cover the details of assignments given each week. The test consists of 15 multiple choice questions, each of which have five possible answers. Select the best possible answer for each question. The test duration is 60 minutes. There is only one test attempt allowed.

Module Tests

A test will be issued once for each module. The test will be available to take on the Monday of the second week of each module. The test is due on Sunday at the end of the second week of the module.

Occasionally, tests may be due on a day of the week other than Sunday. Always check the course schedule posted on Blackboard to determine the current dates for test due dates and times.

Tests are open book. The test must be taken by the due date/time or it receives a zero grade. There is no makeup opportunity for tests. Tests cover reading assignments, discussions, individual assignments, group assignments, and presentations in the module. Tests consists of 40 multiple choice questions, each of which have five possible answers. Select the best possible answer for each question. The test duration is 60 minutes. There is only one test attempt allowed. Tests are challenging. The better you prepare for the test, the better will be the outcome.

Class Interaction and Communication

Being Successful Online

This section has some tips about how to be successful online. Online learning is not a spectator sport. It is everyone's responsibility to participate as fully as they can so everyone can get the most from the experience. Here are some simple rules to follow to ensure your participation and engagement in the learning process:

- Ask questions: If you don't know the answer, someone else will. The discussion board is the place for asking questions related to content, or any problems (related to the class) you are having. Make sure that you have clearly indicated the subject of your message.
- Reach out to others: Offer a fact, article, link, or other item that can help others learn something you can share. Use the discussion board for this purpose.
- Be appropriate: The online classroom is not the place for insulting or insensitive comments, attacks, or venting. Inappropriate behavior can be subject to disciplinary action, as well.
- Be diplomatic: When sending messages on emotionally charged topics, try writing the message and then walk away for at least an hour before re-reading the message and then sending it. Re-reading emotionally charged messages ensures that they are constructive instead of destructive. Think respectfully of the person at the other end.
- Stay focused: Stay on topic to increase the efficiency of your learning.

Grading Criteria

The maximum points achievable is 1220. The following scale is used for assigning letter grades.

Grade	Percentage	Score
A	[90 % and above]	1098 - 1120
B	[80 % - 89 %]	976 - 1097
F	[0 % - 79%]	0 - 975

Note that there will not be “rounding up” automatically. The instructor reserves the right to lower the grade scale if it is deemed appropriate.

Point Distribution

Artifact	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6	Module 7	Total
Readings and Lecture	0	0	0	0	0	0	0	**0**
Discussion	50	50	50	50	50	50	50	**350**
Individual Assignment	40	40	40	40	40	40	40	**280**
Group Assignment	40	40	40	40	40	40	40	**280**
Test	70	40	40	40	40	40	40	**310**
Total	**200**	**170**	**170**	**170**	**170**	**170**	**170**	
							Grand Total	**1220**

Detailed Course Description

Refer to the course calendar posted on Blackboard for specific assignment and test due dates

Module 1, Week 1: Modeling, Simulation, and Model-based Systems Engineering

Activity	Description
Module 1, Week 1 Readings and Lesson Presentations	▪ For CMMI for Development, Version 1.3 read: DAR SP 1.4, OPP SP 1.5, PI SP 1.1; VAL SP 1.1, VER SG 1, TS Introduction section • For INCOSE Systems Engineering Handbook V4 read: Section 4.6 "Systems Analysis Process", Section 9.1 "Modeling and simulation", Section 9.2 "Model-Base System Engineering" ▪ Kumar, Jagat. Modeling and Simulation - Unit one: "System Models and System Simulation" – http://www.ddegjust.ac.in/studymaterial/mca-5/mca-504.pdf ▪ SE 5348 Modeling & Simulation.ppt
Module 1, Week 1 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A **https://utep-edu.zoom.us/j/9343262905**
Module 1, Week 1 Discussion Assignment 1	*Student Introductions* Provide some background on yourself for others to get to know you better. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 1, Week 1 Individual Assignment 1	*Modeling & Simulation Characteristics and Tools* Evaluate the essential characteristics that comprise a "model" and prioritize them according to what they feel is their level of significance. List four (4) characteristics that comprise a model and a short summary to what those characteristics entail in that model. Prioritize the listing of all characteristics into the order of importance for models. Research tools that perform both modeling and simulation, select one, then provide detailed information on the purpose, content, and application of that tools model and simulations.
Module 1, Week 1 Group Assignment 1	*Group Communications Infrastructure* Describe the means by which the group will conduct business, including contact information, meeting times, etc. Be sure to select a group leader. Group leader

Activity	Description
	selection can rotate among team, if desired. Instructor must know who is the leader of each group. Group leaders DO NOT do other members' work.
Module 1, Week 2 Assessment: Test	*Syllabus Test* • This test covers the content of the syllabus relating to student conduct in the course. The test does not cover details of particular assignments due for a given module. • The test consists of 15 multiple choice question with 5 possible answers at 2 points each for a maximum score of 30 points. The test is open book and will last 60 minutes. Only one test attempt is allowed.

Module 1, Week 2: Modeling, Simulation, and Model-based Systems Engineering

Activity	Description
Module 1, Week 2 Readings and Lesson Presentations	▪ For INCOSE Systems Engineering Handbook V4 read: Section 9.2 "Model-Base System Engineering", Section 9.3 "Functions- Based Systems Engineering Method", Section 9.4 "Object-Oriented Systems Engineering Method" ▪ Graignic, Pascat., et al, *Complex System Simulation: Proposition of a MBSE Framework for Design-Analysis Integration*, Procedia Computer Science 16 (2013) 59 – 68, Elsevier. Available at https://www.sciencedirect.com/science/article/pii/S1877050913000082/pdf?md5=002b904148e79305f539c4fe9ce4fb72&pid=1-s2.0-S1877050913000082-main.pdf&_valck=1 and through UTEP library ▪ Model-based Systems Engineering.ppt
Module 1, Week 2 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A **https://utep-edu.zoom.us/j/9343262905**
Module 1, Week 2 Discussion Assignment 2	*MBSE Characteristics* Analyze & prioritize the various MBSE characteristics covered in this module. Also, research & evaluate other MBSE characteristics based upon the provided reading. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 1, Week 2 Individual Assignment 2	*Applying MBSE* Analyze the use of MBSE by evaluating the application of MBSE characteristics to a project in the provided reading. Provide references to where the article's author mentions the MBSE characteristics covered in this module. Also, evaluate the reading for additional MBSE characteristics not mentioned in the module.
Module 1, Week 2 Group Assignment 2	*Selecting MBSE Tools* Investigate commercial tools for MBSE practices with SysML. Use of the Decision Analysis & Resolution process to evaluate six potential tools and aid in the selection of a single tool.
Module 1 Test	*Module 1 Test* • This test covers reading assignments, discussions, individual assignments, group assignments, and presentations in the module. • The test consists of 40 multiple choice questions, each of which have five possible answers. Select the best possible answer for each question. The test duration is 60 minutes. There is only one test attempt allowed.

Module 2, Week 3: Petri Nets

Activity	Description
Module 2, Week 3 Readings and Lesson Presentations	▪ *Petri Nets for Dynamic Even-Driven System Modeling* by Jiacun Wang ▪ SE 5348 M2 Petri Nets v2.pptx
Module 2, Week 3 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A **https://utep-edu.zoom.us/j/9343262905**
Module 2, Week 3 Discussion Assignment 1	*Petri Nets and Activity Diagrams* Activity diagrams were created after Petri Nets and incorporated some of the elements from Petri Nets. Examples of Petri Net elements are: places and transitions. Use the template to evaluate five Petri Net elements included in Activity diagrams, then specify if the semantics of the elements have been preserved. The template includes a link to a web page that describes elements of Activity Diagrams. Complete the table provided in the M2_Discussion 1 template. Then consider which Petri Net element should also be considered for inclusion into Activity Diagrams and why. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 2, Week 3 Individual Assignment 1	*Petri Net Execution* Petri Nets are used when developers are trying to validate and verify a procedural process. Petri Nets allow developers to model discrete event systems, after which the models can be used for validation & verification of the system's behavior. Testing these models involves "firing" the Petri Net, where the tokens (input data) from one place satisfy a transition's requirements for firing and are consumed so as to output other tokens into another place(s). In this assignment, model the process of "firing" a Petri Net, from beginning to end. Instructions 1. You are given a Petri Net that was developed to model a lighting system with mutually exclusive synchronization. It is defined as follows: a. A token in P1 indicates the Off state for both light bulbs, at any time. b. A token in both P2 & P5 each indicates that Light 1 is On. c. A token in both P3 & P4 each indicates that Light 2 is On. 2. Using the provided Petri Nets on the template, start at diagram "T2"and create the step-by-step process of the net firing by placing tokens in the subsequent places after a firing. a. Hint: Make sure to take into account both tokens present in the Petri Net. 3. Write the formal notation for the Petri Net.
Module 2, Week 3 Group Assignment 1	*Petri Nets - Warehouse* Model a new Petri Net for the warehouse scenario given in the template. In your new net, ensure that: 1. You create a new Petri Net model that can prevent some places (such as P3 and P4) from being active simultaneously.

Activity	Description
	2. Your modeled net also prevents more than one token from accidentally falling into the same station. 3. This Petri Net shall be considered a safe net. [In general, places may contain multiple tokens. A Petri Net that never allows two tokens to arrive at the same space is termed safe.] 4. Using the copy & paste functions, create the step-by-step process, graphically, of how your Petri Net shall fire by moving the tokens from the input places to the subsequent output places on this template (as you did in the Petri Net Firing assignment). 5. Label each firing sequentially as T1, T2, T3, T4, etc. 6. Write the formal notation of the updated Petri Net; i.e., P, T, I, O, M.

Module 2, Week 4: Petri Nets

Activity	Description
Module 2, Week 4 Readings and Lesson Presentations	▪ *CMMI for Development*, V1.3 QPM ▪ SE 5348 M2 Petri Nets v2.pptx ▪ SE 5348 M2 Advanced Petri Nets.pptx
Module 2, Week 4 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A **https://utep-edu.zoom.us/j/9343262905**
Module 2, Week 4 Discussion Assignment 2	*Advanced Petri Nets & Property analysis* This discussion has two parts: 1. Colored and Timed Petri Nets were created to address aspects that could not be modeled by normal Petri Nets such as having different type of tokens within a place or having delays or time constraints in the process. Construct and support an argument as to which of these advanced Petri Nets features has a broader application within the SE domain, and support your argument with reasoning. 2. The types of errors that Petri Nets can discover include: boundedness, liveness, reachability, and non-determination. Evaluate and discuss which error-discovery property has a broader application within the SE domain and support your argument with reasoning. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 2, Week 4 Individual Assignment 2	*Petri Net Tools* **Instructions (Part 1 – Lightbulb Control System)** 1. Create a Petri Net in PIPE 2.5 based on the Lightbulb Control System graphic provided in the template. 2. After you have constructed the Petri Net, provide the appropriate initial marking M0 to fire the net. 3. Save your model. 4. Take a screen shot of the original markup of each model and paste it into the template. a. Save images as .GIF files or similar to keep image file size to a minimum. 5. Run the simulation and take a screen shot of the first five firings in the simulation.

Activity	Description
	6. Make as many firings as needed to analyze the behavior of the Petri Net. 7. Take a screen shot of the model at the end of the simulation. a. Label the final firing as "Completed Petri Net" b. Paste the images into the template. 8. Provide a summary analysis of your observations of the Petri Net execution in the template. **Instructions (Part 2 – Unknown System)** 1. Create a Petri Net in PIPE 2.5 based on the Unknown System graphic provided in the template. 2. After you have constructed the Petri Net, provide the appropriate initial marking M0 to fire the net. 3. Save your model. 4. Take a screen shot of the original markup of each model and paste it into the template. a. Save images as .GIF files or similar to keep image file size to a minimum. 5. Run the simulation and take a screen shot of the first five firings in the simulation. 6. Make as many firings as needed to analyze the behavior of the Petri Net. 7. Take a screen shot of the model at the end of the simulation. a. Label the final firing as "Completed Petri Net" b. Paste the images into the template. 8. Provide a summary analysis of your observations of the Petri Net execution in the template. **Instructions (Part 3 – Reachability Bus Example)** 1. Using the bus example from SE 5348 M2 Advanced Petri Nets.pptx, slide 13 (shown below), develop a solution that you can create and simulate in PIPE 2.5. 2. After you have constructed the Petri Net, provide the appropriate initial marking to fire the net. 3. Save your model. 4. Verify that your solution is free of errors using screenshot evidence from the simulation. 5. Take a screen shot of the original markup of each model and paste it into the template. a. Save images as .GIF files or similar to keep image file size to a minimum. 6. Run the simulation and take a screen shot of the first five firings in the simulation. 7. Make as many firings as needed to analyze the behavior of the Petri Net. 8. Take a screen shot of the model at the end of the simulation. a. Label the final firing as "Completed Petri Net" 9. Paste the images into the template.
Module 2, Week 4 Group Assignment 2	*Petri Net Model Modification* **Instructions (Part 1 – Writers and Readers)** 1. Create a Petri Net graph based on the Petri Net Formal Notation – 2 (SE 5348 M2 Petri Nets.pptx, Slide 10)

Activity	Description
	2. The Petri Net described in this formal notation represents the interaction between writers and readers modeling a supply and demand situation. In this model, there is no initial marking (M0 = (0 0 0 0 0)). 3. After you have constructed the Petri Net, provide the appropriate initial marking M0 to fire the net. 4. Save your model. 5. Take a screen shot of the original markup of each model and paste it into the template. a. Save images as .GIF files or similar to keep image file size to a minimum. 6. Run the simulation and take a screen shot of the first five firings in the simulation. 7. Make as many firings as needed to analyze the behavior of the Petri Net. 8. Take a screen shot of the model at the end of the simulation. a. Label the final firing as "Completed Petri Net" b. Paste the images into the template. 9. In the template, document the changes you made to the model to allow it to execute to completion. **Instructions (Part 2 – Four Point Crossing)** In a four-direction (North, East, South and West) traffic intersection. Each direction has two lanes, i.e. an entrance and an exit. There are some constraints on the system behavior that must be factored into the design, as follows: • At most, one car is allowed to be present at the center of the intersection at any moment. • No U-Turns are allowed, e.g. a car entering from North is not allowed to exit to the North. • The number of cars to enter the intersection, one at a time, from any direction can be infinite. • Before a car enters the intersection, the direction in which it will exit is determined randomly. • The progression of cars must be fair. This means you will have to introduce some notion of time into your model. 1. Using the PIPE 2.5 tool, build a Petri Net model of the behavior of this system. 2. After you have constructed the Petri Net, provide the appropriate initial marking M0 to fire the net. 3. Save your model. 4. Take a screen shot of the original markup of each model and paste it into the template. a. Save images as .GIF files or similar to keep image file size to a minimum. 5. Run the simulation and take a screen shot of the first five firings in the simulation. 6. Make as many firings as needed to analyze the behavior of the Petri Net. 7. Take a screen shot of the model at the end of the simulation. a. Label the final firing as "Completed Petri Net" b. Paste the images into the template.

Activity	Description
	8. In the template, describe how the different constraints given above were addressed. **Instructions (Part 3 – Reachability Problems)** 1. Analyze the following Petri Net with its initial marking. It contains errors that causes reachability issues. 2. Assuming that the structure is correct, provide changes to the initial marking that solves the reachability problem. 3. Using the PIPE 2.5 tool, build and execute the Petri Net model. a. The completed Petri Net must **both** 1) contain reachable states, and 2) be live. 4. After you have constructed the Petri Net, provide the appropriate initial marking M0 to fire the net. 5. Save your model. 6. Take a screen shot of the original markup of each model and paste it into the template. a. Save images as .GIF files or similar to keep image file size to a minimum. 7. Run the simulation and take a screen shot of the first five firings in the simulation. 8. Make as many firings as needed to analyze the behavior of the Petri Net. 9. Take a screen shot of the model at the end of the simulation. a. Label the final firing as "Completed Petri Net" 10. Paste the images into the template. 11. Identify the part of the Petri Net where conflicts exist. a. Identify the places involved in the provided template. b. Identify the transitions involved in the provided template.
Module 2 Test	*Module 2 Test* • This test covers reading assignments, discussions, individual assignments, group assignments, and presentations in the module. • The test consists of 40 multiple choice questions, each of which have five possible answers. Select the best possible answer for each question. The test duration is 60 minutes. There is only one test attempt allowed.

Module 3, Week 5: State Transitions Diagrams - Tools

Activity	Description
Module 3, Week 5 Readings and Lesson Presentations	▪ Heitmeyer, Constance. "Applying Practical Formal Methods to the Specification and Analysis of Security Properties." *Naval Research Laboratory*. https://apps.dtic.mil/dtic/tr/fulltext/u2/a464842.pdf ▪ Heitmeyer, Constance, et al. "Tools for constructing requirements specifications: The SCR toolset at the age of ten." *International Journal of Computer Systems Science and Engineering*, vol. 20, no. 1, 2005, pp. 19-35. https://apps.dtic.mil/sti/pdfs/ADA465422.pdf ▪ Heitmeyer CL, Marciniak JJ. 2002. Software Cost Reduction. Encyclopedia of Software Engineering. **https://apps.dtic.mil/dtic/tr/fulltext/u2/a465161.pdf** ▪ SE 5348 M3 SCR Method.pptx ▪ SE 5348 M3 Week 5 Suggested Areas of Focus.pptx ▪ SE 5348 M3 SCR Tables of Cruise-Control Problem.docx

Activity	Description
	▪ SE 5348 M3 State Transition Diagrams v01.pptx
Module 3, Week 5 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A **https://utep-edu.zoom.us/j/9343262905**
Module 3, Week 5 Discussion Assignment 1	*Software Cost Reduction Properties* 1. The Software Cost Reduction tool contains the following four properties/capabilities, as described in SE 5348 M3 SCR Method.pptx Slide 9, and in " Tools for Constructing Requirements Specifications ": a. Consistency & correctness checking (Section 3.3.1) b. Semiformal specification translation (Section 3.3.2) c. Simulation (Section 3.4.1) d. Source code generation (Section 5.2) 2. Prioritize the four items above from **most important** to **least important.** 3. Provide rationale for your priority selection. 4. Supply your inputs in Template 1. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 3, Week 5 Individual Assignment 1	*CCS SCR Tables to STD* 1. Translate the SCR Tables for the Cruise Control System (CCS) into a State Transition Diagram (STD). 2. The specification tables and dictionaries below contain the semi-formal SCR specifications for a CCS on an automobile. 3. Use Tables 1, 3 and 5 to start developing the states and transitions of your STD 4. Use Tables 2, 4, and 6 (the dictionaries) to help define the variables and constants in your diagram. 5. In the State Transition Diagram, you will need to describe its: • **States.** • **Transitions** between states. • **Events [conditions]/actions** for each transition. • You can pull this information from the given tables.
Module 3, Week 5 Group Assignment 1	*Creating SCR Tables* 1. With your group, develop the specifications necessary for operating a standard elevator. The scope of the elevator system is as follows: a. There is only one elevator that serves floors F0, F1 and F2. b. Floors have call buttons for the elevator. c. Elevator have buttons to select desired floor number, i.e., F0, F1, F2. d. Elevator have buttons to open and close the door. e. You shall be able to control where the elevator moves. f. You shall be able to control opening and closing the elevator doors g. Doors can only open and close if elevator is in floors: F0, F1 or F2. h. Elevator can only change direction when it is at floors F0, F1, F2 2. Create a state transition diagram (STD) first. 3. Then translate your SDT into SCR Tables. Follow the process described in section 3 of article "Tools for constructing requirements specifications," Heitmeyer, et al. Start by sketching Fig 1. Then create: a. The Mode Class Dictionary (like Heitmeyer Figure 5)

Activity	Description
	b. Mode Transition Table for the mode class (for the states) (like Heitmeyer Table 4) c. Condition Tables (like Heitmeyer Table 3) d. Variable Dictionary Table (like Heitmeyer Figure 6) e. Dependency Graph (like Heitmeyer Figure 11)

Module 3, Week 6: Simulink Stateflow - Tools

Activity	Description
Module 3, Week 6 Readings and Lesson Presentations	▪ SE 5348 M3 Stateflow.pptx ▪ SE 5348 M3 Getting Started With Stateflow.pptx ▪ Stateflow Video (from The Mathworks, requires creating a free account) https://www.mathworks.com/videos/introduction-to-stateflow-81549.html
Module 3, Week 6 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A **https://utep-edu.zoom.us/j/9343262905**
Module 3, Week 6 Discussion Assignment 2	*SCR & Stateflow Comparison* Stateflow and the SCR method both provide the capability to verify and validate models. 1. Identify three SCR capabilities under these general categories: a. Error Checking (two capabilities are given to start with) b. Simulation c. Formal Specification d. Code Generation e. Others that are in Stateflow but not in SCR 2. Identify and discuss three benefits you think Stateflow has over SCR. 3. Provide your responses in the provided template. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 3, Week 6 Individual Assignment 2	*Stateflow Modeling: Traffic Light Scenario* 1. Review the video "Introduction to Stateflow" (see Reading Resources, above). You have to register with The MathWorks in order to view the video. This video is also available at Blackboard. 2. Open the model within MATLAB by typing and entering "sf_traffic_light" into the command prompt. 3. Shown in the video is a physical model of the Traffic Light system and a State Transition Diagram (STD) for the system's logic (make sure to click on the blue arrow inside the Simulink STD box to view the STD). 4. Your assignment is to modify these diagrams to add in the ability of a light to change to green if an emergency vehicle is in the lane. • **Hint:** *Consider using a "switch" as an input for the emergency vehicle into the Simulink blocks.* 5. Enter your assumptions and the modifications performed on the Traffic Light system within the provided template. 6. Run the simulation to detect any errors. Reiterate modifications until the simulation can run without any errors. 7. Provide a screenshot of your Traffic Light model. 8. Provide a screenshot of your modified Controller.

Activity	Description
	9. Provide a screenshot of your modified Controller 1. 10. Provide a screenshot of your modified Controller 2. 11. Provide a screenshot of any other model element that you think is critical to describing your modifications. 12. Save the Stateflow model as **Traffic_Light_LastName.slx** and upload it to Blackboard as part of your assignment submission. 13. Populate the provided template with the modifications you are making to the Traffic Light Scenario in order to accommodate an emergency vehicle passing through the intersection. One possible scenario modification is provided as an example. You can use this example if it applies to your modified scenario. Minimum of 5 to be supplied. But, don't stop there. Be sure you provide enough to adequately describe how you changed the scenario to accommodate the emergency vehicle in a way that fully describes what you are doing. 14. Populate the provided template with the modifications you are making to the Traffic Light Stateflow Model in order to accommodate an emergency vehicle passing through the intersection. One possible model modification is provided as an example. You can use this example if it applies to your modified model. Minimum of 5 to be supplied. But, don't stop there. Be sure you provide enough to adequately describe how you changed the model to accommodate the emergency vehicle in a way that fully describes what you are doing.
Module 3, Week 6 **Group Assignment 2**	*Stateflow Modeling: Home Security System Scenario* 1. Review the video "Introduction to Stateflow" (see Reading Resources, above). You have to register with The MathWorks in order to view the video. This video is also available at Blackboard. 2. Open the model within MATLAB by typing and entering "sf_security" into the command prompt. 3. Shown in the video is a physical model of a Home Security System (HSS) and a State Transition Diagram (STD) for the system's logic (make sure to click on the blue arrow inside the Simulink STD box to view the STD). 4. Your assignment is to modify these diagrams to include the following new system functionality: a. The user enters a valid password to activate the alarm before leaving the house. b. If a valid password is not entered within a minute, then the alarm shall turn off. c. The system allows the user to enter a valid password to deactivate the alarm and turn the alarm off. d. The alarm activates when the user returns and enters the house and the alarm senses the motion. e. While the alarm is active, if a valid password is not entered within a minute, then the alarm automatically calls the police. f. To keep the modifications simple i. Do not consider any requirement on the number of attempts to enter a valid password ii. Do not consider any requirement on validation of the password (assume that an implied validation process proves the password is correct). 5. Enter out your assumptions and the modifications performed on the HSS within the provided template.

Activity	Description
	6. Run the simulation to detect any errors. Reiterate modifications until the simulation can run without any errors. 7. Provide a screenshot of your HSS model. 8. Provide a screenshot of your modified Controller. 9. Provide a screenshot of your modified Controller 1. 10. Provide a screenshot of your modified Controller 2. 11. Provide a screenshot of any other model element that you think is critical to describing your modifications. 12. Save the Stateflow model as **HSS_LastName_GroupX.slx**, where "X" is the letter of the Group submitting the assignment, and upload it to Blackboard as part of your assignment submission. 13. Populate the provided template with the modifications you are making to the HSS Scenario in order to accommodate an emergency vehicle passing through the intersection. One possible scenario modification is provided as an example. You can use this example if it applies to your modified scenario. Minimum of 5 to be supplied. But, don't stop there. Be sure you provide enough to adequately describe how you changed the scenario to accommodate the emergency vehicle in a way that fully describes what you are doing. 14. Populate the provided template with the modifications you are making to the HSS Stateflow Model in order to accommodate an emergency vehicle passing through the intersection. One possible model modification is provided as an example. You can use this example if it applies to your modified model. Minimum of 5 to be supplied. But, don't stop there. Be sure you provide enough to adequately describe how you changed the model to accommodate the emergency vehicle in a way that fully describes what you are doing.
Module 3 Test	*Module 3 Test* • This test covers reading assignments, discussions, individual assignments, group assignments, and presentations in the module. • The test consists of 40 multiple choice questions, each of which have five possible answers. Select the best possible answer for each question. The test duration is 60 minutes. There is only one test attempt allowed.

Module 4, Week 7: SysML Intro & Requirements Diagrams

Activity	Description
Module 4, Week 7 Readings and Lesson Presentations	▪ INCOSE Handbook, v4.0, section 9.1.9 ▪ Lenny Delligatti. (2014). *SysML Distilled, A Brief Guide to the Systems Modeling Language.* First edition. Addison-Wesley, Chapter 2, Overview of the Systems Modeling Language. ▪ Hause, Matthew, et al. "*Testing Solutions through SysML/UML.*" INCOSE, 2009. Obtained via the INCOSE "Wiley Online Proceedings Library" ▪ Note: This article is available through INCOSE. See the **SE 5348 Home Page on Blackboard -> Student Resources -> INCOSE International Symposium Presentations** for a description of how to access technical papers through INCOSE. ▪ L. Li, N. Wang, L. Ma and Q. Yang, "*Modeling method of military aircraft support process based SysML*," The Proceedings of 2011 9th International

Activity	Description
	Conference on Reliability, Maintainability and Safety, Guiyang, 2011, pp. 1247-1251. doi: 10.1109/ICRMS.2011.5979460 ▪ Note: This article is available through the IEEE Xplore resource via the UTEP Library. See the **SE 5348 Home Page on Blackboard -> Student Resources -> Library Guide** for a description of how to access technical papers through the UTEP Library. ▪ SE 5348 M4 SysML Introduction.pptx ▪ How To Access INCOSE Publications in the Wiley Online Proceedings Library.pptx ▪ How To Access Technical Papers from the UTEP Library.pptx
Module 4, Week 7 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A **https://utep-edu.zoom.us/j/9343262905**
Module 4, Week 7 Discussion Assignment 1	*Comparing SysML with UML* 1. The System Modeling Language (SysML) addresses many shortcomings that systems engineers felt were not addressed by the Unified Modeling Language (UML) when modeling systems. Why was UML not sufficient for SE needs? Elaborate on two of these reasons/needs that were addressed by SysML. 2. UML class diagrams and SysML block definition diagrams (bdd) are both types of blocks diagrams used in the modeling languages covered. Evaluate and compare two common elements and two differences among UML class diagrams and SysML block definition diagrams (bdd). 3. Why was the internal block diagram (ibd) created? Evaluate two needs of SE that are addressed by this diagram that are not covered in any UML diagrams and explain the rationale behind your decision. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 4, Week 7 Individual Assignment 1	*SysML Diagrams Overview* Apply knowledge of the intended purpose of SysML diagrams and the applicable concepts in which they can each represent. 1. Provided in the first column of Template 1 is a systems concept that requires a visual representation. 2. Consider what SysML diagram(s) are the best fit for that concept and explain why. a. One example is provided. 3. In each row, you may decide that only one diagram applies to representing the requested information. In that case, only complete the column for Diagram A. 4. In some cases, you may decide that a second diagram (B) also applies. In that case, complete the column for Diagram B as well.
Module 4, Week 7 Group Assignment 1	*SysML Diagrams Overview* Apply knowledge of the individual diagrams within SysML and the information that each diagram is intended to be provided from the systems engineer to the rest of the development team. 1. Read the article "Modeling Method of Military Aircraft Support Process Based SysML"

Activity	Description
	2. Provide guidelines as to the use of each of the SysML diagrams listed in Template 1 in terms of addressing some information need identified in the article. • It is NOT enough to just state the purpose of the diagram. • Consider and describe how the diagram satisfies the information need described in the article. • If the SysML diagram is not represented in the article say "Not covered in article." 3. Identify and provide figure numbers from the article that corresponds to each type of diagram. • Provide only **one** figure number per diagram type. • If the SysML diagram is not represented in any figure in the article, say "N/A".

Module 4, Week 8: SysML Intro & Requirements Diagrams

Activity	Description
Module 4, Week 8 Readings and Lesson Presentations	▪ Lenny Delligatti. (2014). *SysML Distilled, A Brief Guide to the Systems Modeling Language.* First edition. Addison-Wesley, Chapter 11, Requirements Diagrams. ▪ Dos Santos Soares, Michel, and Jos Vrancken. "*Model-Driven User Requirements Specification using SysML*." Journal of Software, vol. 3, no. 6, June 2008, pp. 57-68, doi:10.1.1.523.5486. Accessed 31 Aug. 2017. ▪ https://www.researchgate.net/publication/42804536_Model-Driven_User_Requirements_Specification_using_SysML ▪ SE 5348 M4 Requirement Diagram.pptx
Module 4, Week 8 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A **https://utep-edu.zoom.us/j/9343262905**
Module 4, Week 8 Discussion Assignment 2	*Requirement Diagram Relationships* 1. Create guidance in Template 1 for the use of the indicated requirement relationship types 2. For each of the relationship types in the template ▪ Indicate the purpose of the relationship type, elaborating when and/or how to use the relationship type ▪ Indicate whether the graphic line used to depict the relationship is Solid or Dashed ▪ Describe the direction of the graphical line adornment (arrowhead for requirements relationships or crosshairs symbol for containment), this would be one of the following choices: ▪ Requirements-to-requirements ▪ Requirements-to-model elements ▪ Either requirements-to-requirements, or requirements-to-model elements Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 4, Week 8 Individual Assignment 2	*Requirement Relationships: Emergency Smoke Management System*

Activity	Description
	It is not only important to know the syntax and semantics of a diagram, but also its application. Students shall use their knowledge to identify the types of relationships that are missing between elements in a provided requirements diagram. 3. A separately provided PowerPoint-based template contains a requirement diagram for an Emergency Smoke Management System (ESMS) of a building. The diagram is reproduced below for reference. The types of requirement relationships between each requirement and/or model element are missing. 4. Review the diagram in the PowerPoint file and assess the nature of the relationships between each of the diagram elements. 5. Supply the missing relationships that exist between the requirements and/or model elements by copying from graphical elements in the legend. Note that there is one "Model Element" (a block), the rest are all requirements. ▪ Modify the diagram using the correct syntax: ▪ Lines between diagram elements (dashed or solid) ▪ Line adornment (arrowheads or crosshairs) ▪ Including indication of which end of the line the adornment goes on ▪ Requirement relationship type (surrounded by «guillemets») 6. Supply the modified PowerPoint Template as your assignment submission according to the instructions in Blackboard for this assignment. 7. PowerPoint Template: M4W08_A2 Graphical Template.pptx
Module 4, Week 8 Group Assignment 2	*Creating a Requirements Diagram for an Elevator System* Developing abstract models takes a keen mindset and practice. 1. Refer to the definition of the Elevator System in Module 3, Week 6. 2. Create a set of requirements for a package of the system. You may reuse requirements stated or derived from the definition of the system provided in Module 3. You may also search for other requirements for these types of systems. Do not over specify the system. Just document enough requirements to create your diagram, as indicated in Step 3. 3. Create a Requirements Diagram that includes: ▪ 1 top-level requirement ▪ 4 requirements representing requirement specifications (containment relationship) ▪ 3 derived requirements «deriveReqt» ▪ 2 refined requirements «refine» ▪ 2 satisfying model elements (blocks) «block» ▪ 2 verifying elements (test cases) «verify» 4. A separately provided PowerPoint-based template contains the graphical elements you can copy/paste to create your requirements diagram. 5. Supply the modified PowerPoint template as your assignment submission according to the instructions in Blackboard for this assignment. 6. PowerPoint Template: M4W08_G2 Graphical Template.pptx
Module 4 Test	*Module 4 Test* This test covers reading assignments, discussions, individual assignments, group assignments, and presentations in the module. The test consists of 40 multiple choice questions, each of which have five possible answers. Select the best possible answer for each question. The test duration is 60 minutes. There is only one test attempt allowed.

Module 5, Week 9: SysML Structure Diagrams

Activity	Description
Module 5, Week 9 Readings and Lesson Presentations	▪ Lenny Delligatti. (2014). *SysML Distilled, A Brief Guide to the Systems Modeling Language.* First edition. Addison-Wesley, Chapters 3 and 4. Focus on material that helps you complete assignments. ▪ SE 5348 M5 SysML BBD and IBD.pptx ▪ SE 5348 M5 Guide to Interpreting Reading Material for BDD and IBD.docx ▪ SE 5348 M5 Notes on Building BDDs and IBDs.pptx ▪ Finance_SysML_Modelling_Language_Explained.pdf found at https://www.omgsysml.org/SysML_Modelling_Language_explained-finance.pdf
Module 5, Week 9 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A https://utep-edu.zoom.us/j/9343262905
Module 5, Week 9 Discussion Assignment 1	*Build an IBD from a BDD* First, write a guideline to create an Internal Block Diagram (IBD) from a Block Definition Diagram (BDD). The guideline shall list the steps to be followed. Second, write a verification checklist with at least five criteria to assure that *BDD* and *IBD* are consistent. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 5, Week 9 Individual Assignment 1	*Modeling System Scope* Develop a Block Definition Diagram (BDD) and an Internal Block Diagram (IBD) for the Candy Machine system. ▪ SE 5348 M5 Candy Dispenser Example.pptx
Module 5, Week 9 Group Assignment 1	*Defining Sys Scope BDD & IBD* Find a manual or technical description for a washing mashing, dishwasher, or similar device and identify main components. Create a BDD, IBD, and perform a consistency review.

Module 5, Week 10: SysML Structure Diagrams

Activity	Description
Module 5, Week 10 Readings and Lesson Presentations	▪ Lenny Delligatti. (2014). *SysML Distilled, A Brief Guide to the Systems Modeling Language.* First edition. Addison-Wesley, Chapter 9. Focus on material that helps you complete assignments. ▪ SE 5348 M5 Package & Parametric Diagram.pptx ▪ SE 5348 M5 Notes on Value Properties.pptx
Module 5, Week 10 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A https://utep-edu.zoom.us/j/9343262905
Module 5, Week 10 Discussion Assignment 2	*Build Parametric from Block Definition diag.* First, write a guideline to create a parametric diagram from a class diagram with constraint blocks. The guideline shall list the steps to be followed. Second, write a verification checklist with at least five criteria to assure that the *Block Definition diagram* and the *Parametric diagram* are consistent. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.

Activity	Description
Module 5, Week 10 Individual Assignment 2	*Parametric Diagram* Using the Candy vending machine from Module 5 Week 9, create a class diagram with constraint blocks and then define the parametric diagram.
Module 5, Week 10 Group Assignment 2	*Package & Parametric Diagram* Create a Block Definition diagram with constraint blocks (system equations and their parameters); create the parametric diagram; and create a package diagram.
Module 5 Test	*Module 5 Test* This test covers reading assignments, discussions, individual assignments, group assignments, and presentations in the module. The test consists of 40 multiple choice questions, each of which have five possible answers. Select the best possible answer for each question. The test duration is 60 minutes. There is only one test attempt allowed.

Module 6, Week 11: SysML Behavior Diagrams

Activity	Description
Module 6, Week 11 Readings and Lesson Presentations	▪ Lenny Delligatti. (2014). *SysML Distilled, A Brief Guide to the Systems Modeling Language.* First edition. Addison-Wesley ▪ Chapter 5 – Use Case Diagrams ▪ Chapter 7 – Sequence Diagrams ▪ Focus on material that helps you complete the assignments ▪ SE 5348 M6 Use Case & Sequence Diagrams.pptx
Module 6, Week 11 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A **https://utep-edu.zoom.us/j/9343262905**
Module 6, Week 11 Discussion Assignment 1	*Defining the System Context* As system engineer, you should have a good understanding of both a) the intended use (purpose) of the model and b) the semantics and syntax of the diagrams that represent the model. Based on the system's context and the circumstances, you should decide which kind of model is more appropriate. In this discussion, you will compare and contrast four modeling diagraming techniques for defining system scope and system component interactions. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 6, Week 11 Individual Assignment 1	*Developing System Use Scenarios* In modeling the dynamic aspects of a system, it is important to understand the different behaviors that a system can take. One way to understand the different behaviors of a system is to analyze the different scenarios to deliver system services; that is, the sequence of interactions between actors and system components that take place while delivering a system service (a use case). In this assignment, you will create scenarios for registering a student in a university online course and the visual representation of these scenarios using sequence diagrams.
Module 6, Week 11 Group Assignment 1	*Using SysML Diagrams for the Elevator System* The intended services that a System of Interest (SOI) provides to actors and the behaviors that the SOI performs while delivering that service should be well understood by engineers developing the SOI. In this assignment, you create a use case diagram and a sequence diagram for the Elevator System that you have dealt with in a previous assignment in this course.

Module 6, Week 12: SysML Behavior Diagrams

Activity	Description
Module 6, Week 12 Readings and Lesson Presentations	▪ Lenny Delligatti. (2014). *SysML Distilled, A Brief Guide to the Systems Modeling Language.* First edition. Addison-Wesley, Chapter 6 Activity Diagrams and Chapter 8 State Machine Diagrams. Focus on material that helps you complete the assignments. ▪ SE 5348 M6 Activity Diagrams & State Machine Diagrams.pptx
Module 6, Week 12 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A **https://utep-edu.zoom.us/j/9343262905**
Module 6, Week 12 Discussion Assignment 2	*Defining the System Behavior* Systems engineers have four SysML diagrams available for modeling the behavior of a system. These diagrams are: 1) the Use Case Diagram (UC), 2) Sequence Diagram (SD), 3) Activity Diagram (ACT), and 4) State Machine Diagram (STM). In this discussion, you will analyze and identify the applications of these behavioral diagrams in SysML. Post your initial response to this discussion question. Also respond to at least two of your peers' submissions.
Module 6, Week 12 Individual Assignment 2	*Modeling the States of an Automobile* Behavioral analysis can be very useful in describing the states that a system can exist within as well as the events that causes changes between those states. These can be visually represented by a state machine diagram in SysML. In this assignment, you will analyze the states that exist within a typical modern automobile and the event-driven responses that can occur within the system and create a state machine diagram.
Module 6, Week 12 Group Assignment 2	*Modeling System Behavior* In modeling the behavior of a system-of-interest, it is important to fully understand a scenario involved in providing a service, as this is the entire reason to a system's existence. Activity diagrams shall now be used to depict the flow of the activities between actors and the system, modeling synchronization and concurrency of activities. State machine diagrams model the activities performed within different event-driven modes that a system can exhibit in response to different stimuli. In this assignment, you and your group will analyze and depict the behavior of three systems-of-interest by creating an Activity diagram and State Machine diagram.
Module 6 Test	*Module 6 Test* This test covers reading assignments, discussions, individual assignments, group assignments, and presentations in the module. The test consists of 40 multiple choice questions, each of which have five possible answers. Select the best possible answer for each question. The test duration is 60 minutes. There is only one test attempt allowed.

Module 7, Week 13: SysML Modeling with No Magic's Cameo Systems Modeler

Activity	Description
Module 7, Week 13 Readings and Lesson Presentations	In the assignments for this module, you will make use of Cameo Systems Modeler to complete various labs provided to you on Blackboard. These labs will include items such as creating a new project, importing requirements, and modeling use cases, activities, and structure. ▪ Student Workbook (Lab Manual)

Activity	Description
Module 7, Week 13 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A https://utep-edu.zoom.us/j/9343262905
Module 7, Week 13 Individual Assignment 1	Perform Labs 1 through 4 in the Student Workbook
Module 7, Week 13 Individual Assignment 2	Perform Labs 5 and 6 in the Student Workbook
Module 7, Week 13 Individual Assignment 3	Perform Lab 7 in the Student Workbook

Module 7, Week 14: SysML Modeling with No Magic's Cameo Systems Modeler

Activity	Description
Module 7, Week 14 Readings and Lesson Presentations	In the assignments for this module, you will make use of Cameo Systems Modeler to complete various labs provided to you on Blackboard. These labs will include items such as creating a new project, importing requirements, and modeling use cases, activities, and structure. ▪ Student Workbook (Lab Manual)
Module 7, Week 14 Video Classroom	▪ Weekly video classroom hour to discuss topics, assignments, and Q&A https://utep-edu.zoom.us/j/9343262905
Module 7, Week 14 Individual Assignment 4	Perform Labs 8 and 9 in the Student Workbook
Module 7, Week 14 Individual Assignment 5	Perform Lab 10 in the Student Workbook
Module 7, Week 14 Individual Assignment 6	Optional Student Survey (All students get 20 points whether you participate in the survey or not.)
Module 7 Test	*Module 7 Test* This test covers reading assignments, discussions, individual assignments, group assignments, and presentations in the module. The test consists of 40 multiple choice questions, each of which have five possible answers. Select the best possible answer for each question. The test duration is 60 minutes. There is only one test attempt allowed.

Student Participation

Students bring a wealth of knowledge and experience to this course from their respective fields; however, students' knowledge and technological expertise vary. The course is designed to be an enjoyable learning experience for everyone, with support for every participant. This course will immerse students into a community of practice so that students can develop skills and knowledge that facilitate their professional development.

Students are expected to complete all weekly content and to participate actively and respectfully on discussion boards, chats, and blogs, as well as synchronous or asynchronous collaboration tools where the main course concepts are discussed and class projects are developed. Furthermore, students should finish tests and deliver complete quality assignments and projects on time.

The following policies will be enforced:

- Students must complete all discussion boards assigned for each week to receive a weekly participation grade.

- Students who miss three assignments will be dropped from the course.
- Students who have little or no activity in the course will be dropped.

Students who attend the weekly video classroom sessions tend to learn more and perform better in the assignments and tests. Please make every effort to attend. During these sessions, the instructor will be available to answer any questions related to course material that you might have. Participation in these sessions is for your benefit. Your participation will not be graded, so you can be open and frank with your questions about course material. Do not be afraid to ask a dumb question, since, in learning there is no such thing as a dumb question. The instructor is here to provide you with the opportunity to learn the course material. I encourage you to take advantage of that opportunity by asking questions about course subjects you need help understanding. Any information shared by the instructor during a video classroom session will be considered course material and is subject to being included in module tests.

Assessing Student Learning

This course uses several different methods to assess student learning. A description of each method follows:

Peer Review: In a peer review, students can get the feedback they need to become more successful in a less stressful situation. For peer review to be successful, the instructor will provide clear guidelines and/or questions to be answered by the student reviewers.

Self-Reflection/Self-Evaluation: Reflection and self-evaluation develop metacognitive thinking. By engaging in self-review, students can carry their learning into other parts of their lives and take more responsibility for their own learning. Although not all students take self-evaluation seriously, those who do will benefit greatly from it.

Group Problem Solving: Students will be assigned to a group. When students work together to solve a problem or complete a project, they learn from each other and expand learning for all. Student-to-student interaction is increased, which in turn increases student learning and assignment completion. The group charter will include procedures for managing disagreements within the group; these ground rules make for a much smoother and more effective group experience for all.

Each group will designate a group leader. The group leader coordinates the activities of the group, but IS NOT responsible for performing other students' work. The group leader resolves any technical problems, in coordination with the instructor, if necessary. Personal problems are first handled by the group leader and then escalated to the instructor, if necessary. The group leader has the authority to assign tasks, review status, and resolve issues within his or her technical scope.

In business, all employees are required and expected to be respectful of all other employees. The same applies to students in groups. All students will be treated with respect and will be given a chance to voice their opinion within the group. The instructor, in coordination with the department and the university, will deal directly with any complaints from students related to lack of respect and lack of inclusion within the groups.

Tests: Tests will be available to take for seven days. Tests will be open (become available) starting on the second Monday of each module, and then will be due on the last Sunday evening of the module.

Occasionally, tests may be due on a day of the week other than Sunday. Always check the course schedule posted on Blackboard to determine the current dates for test due dates and times.

If you miss taking the test during the seven-day period, you will receive zero points with no provision to take the test at a different time. Tests will be open book. However, the questions will require critical thinking in a short amount of time, so be sure you understand the course material. If you have any doubts about understanding, ask questions of your fellow students in the discussion board and at the video classroom sessions. Tests will focus on course material covered in the current module up to that point in time, possibly including material from prior modules. Tests are to be taken individually, not collaboratively.

Rubrics: Rubrics are an objective way of assessing work. They provide clear criteria that can be shared with students so that they know how they will be graded. The criteria used for each assignment will be indicated as part of the assignment.

Course Rules and Policies

Ground Rules for Discussion Board Participation

You should observe the minimum word count in your discussion posting in response to the provided questions. You should also reply (with the minimum word count for each response) to the entries of at least two of your classmates for each assigned discussion (unless noted otherwise). Refer to the discussion board and course content for further details on each assignment.

Remember your place: A Web-based classroom is still a classroom, and comments that would be inappropriate in a regular classroom are likely to be inappropriate in a Web-based course as well.

This is permanent: Think carefully about the content of your message before contributing it. Once sent to the group, there is no taking it back. Members of the class and the instructor will be reading any postings.

Respect your fellow students and instructor. Respect and courtesy must be provided to classmates and to instructor at all times. Do not use inappropriate language, all capital letters, or language short cuts. No harassment, flaming, or inappropriate postings will be tolerated.

Giving feedback professionally: Write constructive feedback by addressing the idea, not the person. People may have different points, positions and believes in the aspects being discussed. The discussion must be limited to the aspects/ideas only. Personal attacks are not tolerated. When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a face-to-face situation. Even if you disagree with another student's argument, you can provide a counter-argument in a positive, constructive way.

Be forgiving: If someone states something that you find offensive, mention this directly to the instructor. Remember that the person contributing to the discussion is also new to this form of communication. What you find offensive may quite possibly have been unintended and can best be cleared up by the instructor.

Language: Given the absence of face-to-face clues, written text can easily be misinterpreted. Avoid the use of strong or offensive language and the excessive use of exclamation points. If you feel particularly strongly about a point, it may be best to write it first as a draft and then to review it, before posting it, in order to remove any strong language.

Test for clarity: Messages may often appear perfectly clear to you as you compose them, but turn out to be perfectly obtuse to your reader. One way to test for clarity is to read your message aloud to see if it flows smoothly. If you can read it to another person before posting it, even better.

Submit quality work. Online entries should be written in Standard Writing English with edited spelling, grammar, and punctuation. Although the grammar and spelling of a message typically are not graded, they do reflect on you, and your audience might not be able to decode misspelled words or poorly constructed sentences. It is a good practice to compose and check your comments in a word-processor before posting them.

Follow the parameters / Stick to the point: Follow the posting requirements and parameters set up by the instructor. Contributions to a discussion should have a clear subject header, and you need to stick to the subject. Don't waste others' time by going off on irrelevant tangents.

Read first, write later: Don't add your comments to a discussion before reading the comments of other students unless the assignment specifically asks you to do so. Ignoring your fellow students is rude. Avoid repetition of what someone else has already said. Add something new to the discussion. Comments related to the content of previous messages should be posted under them to keep related topics organized, and you should specify the person and the particular point you are following up on.

Quality posts get credit: There will be no credit given for answers that simply say “Yes” or “No” or something similar with no technical discussion. Posts should justify positions and provide specific examples. Students must demonstrate that they have read the assignment and their classmates' comments carefully and thoughtfully.

Meet the deadline: Be sure to post assignments in a timely fashion to receive credit for the discussion. Pay close attention to the posted deadlines. Late deliveries will receive a score of zero (0).

When work or personal events interfere with the class: As soon as you know that you may have a meeting, business travel, or other event that interferes with being able to complete and submit your homework on time, you must send me an email ***IMMEDIATELY,*** preferably with a one-to-two-day advanced notice, so I can take that into account when grading your work. Telling me after the fact is too late to avoid losing points on your homework. Please send the email to my UTEP address jgartus@utep.edu.

Group assignments: Students will work in groups. Students should develop soft skills to properly and effectively work as a group member. Group members are expected to be respectful of each other, have a positive attitude, deliver quality work on time, participate in peer reviews, and support other group members. All submitted group assignments shall clearly indicate who did what work. *A student can only receive credit for the group project work, if he/she is an equally contributing member of a group*.

If a group member is not working or is performing poorly or irresponsibly, the group must let the member know about the problem (show a yellow card), offer him/her help, and inform the instructor of the situation. If a group member continues performing poorly or irresponsibly, the group may request the instructor to remove the student from the group (show a red card). The group leader shall send an e-mail to the instructor and all group members including the affected group member indicating that a yellow or red card has been called with a brief explanation of the circumstances. Depending on the severity of the situation, the Department and/or University Title IX Coordinators may be called in to adjudicate the situation (by US Federal Law).

Role of Group Leader: In most group settings, someone with the requisite maturity needs to be appointed to make critical decisions for the group. The role of the group leader is that of organizer and promoter of good group practices. The role of the group leader is not to take on additional assignment work load. Not all people have leadership skills. Each group should discuss the group leader role and select someone who is capable of being a good leader for the group. For the selected group leader, this is an opportunity for you to practice your leadership skills. Your job is to take the steps necessary to ensure the group is well coordinated, not to bail the group out by taking on other people's assignments for them.

Academic Dishonesty

Academic dishonesty is prohibited and is considered a violation of the *UTEP Handbook of Operating Procedures*. It includes, but is not limited to, cheating, plagiarism, collusion, and fabrication.

- Cheating can involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports.
- Plagiarism occurs when someone intentionally or knowingly represents another person's words or ideas as his or her own.
- Collusion involves unauthorized collaboration with another person or group to commit any academically dishonest act.
- Fabrication occurs when false information is included on a works-cited page.

Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. Violations will be taken seriously and will be referred to the Office of Student Conduct and Conflict Resolution for possible disciplinary action. Students may be suspended or expelled from UTEP for such actions. You can find more information in the *UTEP Handbook of Operating Procedures*, under the heading "4.14: Alleged Student Scholastic Dishonesty," and in the Regents' Rules and Regulations.

Policy on Copyright and Fair Use

The University requires all members of its community to follow copyright and fair-use requirements. Students are individually and solely responsible for violations of copyright and fair-use laws. The University will neither protect nor defend students and will not assume any responsibility for students who violate fair-use laws. Violations of copyright laws can result in federal and state civil penalties and criminal liability, as well as disciplinary action under University policies.

Other References

- UTEP Handbook of Operating Procedures https://www.utep.edu/hoop/
- UTEP Office of Student Conduct and Conflict Resolution https://www.utep.edu/student-affairs/osccr/
- UTEP Office of Institutional Compliance https://www.utep.edu/compliance/
- UT Regents' Rules and Regulations https://www.utsystem.edu/offices/board-regents/regents-rules-and-regulations

Disability Statement

If you have a disability and need special accommodation, please contact the Center for Accommodations and Support Services (CASS) at 915-747-5148, send email to cass@utep.edu, or visit the office located in UTEP Union East, Room 106. Then notify me as soon as CASS has approved your request for

accommodation. Otherwise, you are expected to complete all assignments and meet all deadlines as specified in this syllabus.

For additional information, please visit the CASS website at www.sa.utep.edu/cass.

COVID-19 Precautions

Please stay home if you (1) have been diagnosed with COVID-19, or (2) are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, and alternative instruction will be provided. The Student Health Center is equipped to provide COVID 19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org

Software Requirements

In addition to technical software identified in the section titled "Required Computer Software", you will need the following software on your computers to efficiently work in this course. In some cases, your computer may already have some of these programs installed.

- **Adobe Acrobat Reader.** You can get the program by going to http://www.adobe.com/ and then clicking on the icon on the center of the screen which says 'Get Adobe Reader' Follow instructions to install the reader.
- **Adobe Flash Player.** You can get the player by going to http://www.adobe.com/ and then clicking on 'Get Adobe Flash Player'. Follow instructions to install the player.
- **Apple QuickTime Player.** You can get this player by going to http://www.apple.com/. Once there, click on the 'Downloads' tab on the top of the page and then click on QuickTime 'Download' and follow instructions.
- **Microsoft Office.** I recommend buying this if you do not have any word processing software or presentation software. As students, you should be able to obtain this from the Engineering Technology Center at https://www.utep.edu/engineering/etc/Software/ or https://my.apps.utep.edu/
- **Email tool** with file attachment capability. Please use your UTEP email account.
    - If you do not have a UTEP e-mail account, please get one immediately. Here is how:
        - Go to https://newaccount.utep.edu/
        - Create your account (remember that your date of birth is in the form mm/dd/yyyy: two digits for the month and day, and four digits for the year).
        - After you create your account, you must wait 48 hours, then go back to the site and click on "Check on existing account." Enter your UTEP Student ID Number (e.g. 80XXXXXX) and date of birth, and you will get your login name and password. Please let one of us know if you have any difficulty. You may also call UTEP Technology Support at 915-747-4357.
        - The Technology Support desk hours are given below:
          Mon-Fri 7:00am - 8:00pm (Mountain Time)
          Sat 9:00am - 2:00pm (Mountain Time)
          Sun 12:00pm - 5:00pm (Mountain Time)

Equipment Requirements

You ***need a personal computer*** to view course material, submit assignments, and take the tests at the end of the modules. You will also need to install software applications that may require administrative privileges. You should be aware that some organizations protect their computer equipment with firewalls, other security applications, and do not provide administrative privileges to their employees. If you are using a computer from your work, you may not be able to take the tests or to install software applications required in some classes; however, this is not a valid excuse for not taking a test or uploading assignments to Blackboard.

Glossary

Cyber-Harassment, or the use of a computer to cause a person harm such as anxiety, distress or psychological harm, including abusive, threatening or hateful emails and messages and the posting of derogatory information online.

Cyberbullying, or intimidating messages sent directly to the victim via email or other Internet communication mediums, and/or the use of technological means to interfere with a victim's use of the Internet such as hacking or denial of services attacks. This can also include spreading rumors about the victim in internet forums or discussion boards; subscribing the victim to unwanted online services or sending messages to others in the victim's name.

Cyberstalking, or threatening behavior or unwanted advances directed at another using the Internet and other forms of online and computer communications. With personal information becoming readily available to an increasing number of people through the Internet and other advanced technology, state legislators are addressing the problem of stalkers who harass and threaten their victims over the World Wide Web.

Flaming, or hostile and insulting interaction between internet users. It is frequently the result of the discussion of heated real-world issues such as politics, religion, and philosophy, or of issues that polarize subpopulations, but can also be provoked by seemingly trivial differences.

Deliberate flaming, as opposed to flaming as a result of emotional discussions, is carried out by individuals who are specifically motivated to incite flaming. Usually, are subtler than their counterparts, or trolls, who also post inflammatory messages in an online community. Their primary intent is to provoke readers into an emotional response and disrupt normal, on-topic, discussion.

Plagiarism, or the presentation of another person's work as your own, whether you mean to or not (i.e. copying parts of or whole papers off the Internet).

Collusion, or lending work to another person to submit as his or her own.

Fabrication, or deliberately creating false information on a works cited page.