

The University of Texas at El Paso
Systems Modeling and Simulation – SE 5348
Spring 2023 – Course Syllabus

Professor: Dr. Ana C. Cram
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Class meets: Business Building, 304, Wednesdays 6:00 pm – 8:50 pm

Office hours: E-201L or Microsoft Teams, Tuesdays, and Thursdays 11:00 am – 12:00 pm, and by appointment

Course web page:

<https://blackboard.utep.edu/>

Course Description:

This course covers the discipline, practice and key process activities performed by systems engineers. This course focuses on ISO/IEC 15288:2002(E) – *Systems engineering – Systems life cycle processes* to ensure its usefulness across a wide range of application domains – man-made system products, as well as business and services. The use of models, simulations, and Model Base System 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. The course covers in detail the models included in the System Modeling Language (SysML) such as Use Case Diagram, Requirements Diagram, Sequence Diagram, Block Definition Diagram, Internal Block Diagram, and the Parametric Diagram. Students will use simulation tools that supports both SysML models and the MBSE approach to create models and execute simulations.

Prerequisites:

SE 5341: Systems Engineering Fundamentals (with a grade of "C" or better)

SE 5342: Systems Engineering Management (with a grade of "C" or better)

Course objectives:

- To apply modern software to conduct analysis of real world systems.
- The ability to apply the appropriate analytical techniques to a wide range of real world problems and data sets.
- To summarize and present the analysis results in a clear and coherent manner.
- 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.

Required textbook:

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.

Useful references:

1. Friedenthal, Sanford, et al. A Practical Guide to SysML: The Systems Modeling Language. Third ed., The MK/OMG Press. Klöpffer, W., and Grahl B. (2014). Life Cycle Assessment (LCA). Ed. Wiley.

Academic Honesty

It is expected that the students will conduct with integrity in all course areas. Do not attempt to engage in dishonest activities such as copying, plagiarism, falsifying information, etc. The professor will take measures to prevent such instances and will bring a case to the university authorities. Information about University-wide policies could be found in the Dean of Students Web page at <http://studentaffairs.utep.edu/Default.aspx?alias=studentaffairs.utep.edu/dos>

Grading

ITEM	Percentage
Presentations	10%
Homework assignments	10%
Lab assignments	20%
Mid-term project	20%
Final project presentation	20%
Final project report	20%

Final Project Description

The main objective of this project is to apply the knowledge acquired in the labs to create a SysML project. Detail instructions, data and requirements will be provided.

- Teams of 3 students
- Submit a final typed report (~20 pages, in word format, 1.5 spacing, Times New Roman 12)

Equipment Requirements

You *need a personal computer* with administrative privileges so that you may take the labs at the end of each module. You will also install other software applications that requires administration privileges. Not being able to use a work computer to take the labs or to install software applications is not an excuse to not submit work.

Students with disabilities:

Students with disabilities or who suspect they have a disability may wish to self-identify for purposes of modifications. You can do so by providing documentation to the Office of Disabled Student Services located in the UTEP Union. If you have a condition which may affect your ability to exit safely from the premises in an emergency or which may cause an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or director of the Disabled Student Services. For general information about the American with Disabilities Act (ADA), please call 747-5184

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.

1. Cheating can involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports.
2. Plagiarism occurs when someone intentionally or knowingly represents another person's words or ideas as his or her own.
3. Collusion involves unauthorized collaboration with another person or group to commit any academically dishonest act.
4. 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 "" and in the Regents' Rules and Regulations.

UTEP Handbook of Operating Procedures @

<http://admin.utep.edu/Default.aspx?alias=admin.utep.edu/hoop>

UTEP Office of Student Life @ <http://sa.utep.edu/studentlife/#student-conduct>

Cell phone policy- Cell phones are to be off or mute during class. You should not take phone calls during class, except for emergencies.