



# Applying Systems Engineering to the Design Process

This course is part of [Introduction to Systems Engineering Specialization](#)



Instructor: [William Van Atten](#) [Top Instructor](#)

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## 5 modules

Gain insight into a topic and learn the fundamentals.

**4.8 ★**

(34 reviews)

### Beginner level

Recommended experience ⓘ

### Flexible schedule

2 weeks at 10 hours a week

Learn at your own pace

### Build toward a degree

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## What you'll learn

- ✓ Describe the core roles and responsibilities of a systems engineer
- ✓ Define a system including its specifications, requirements, and functions
- ✓ Identify decision support approaches

## Skills you'll gain

- Requirements Management   Performance Measurement   Software Engineering   Data-Driven Decision-Making   User Requirements Documents   Decision Making  
Engineering Design Process   Business Requirements   Engineering Management   Coordination   Systems Integration   Manufacturing and Production  
Systems Engineering   Design Reviews   Systems Design   Requirements Analysis   Leadership   [View less skills](#)

## Details to know



### Shareable certificate

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### Assessments

7 assignments



### Taught in English

7 languages available

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## Build your subject-matter expertise

This course is part of the [Introduction to Systems Engineering Specialization](#)

When you enroll in this course, you'll also be enrolled in this Specialization.

- Learn new concepts from industry experts
- Gain a foundational understanding of a subject or tool
- Develop job-relevant skills with hands-on projects
- Earn a shareable career certificate

## There are 5 modules in this course

In this course, you will learn what a systems engineer does. Following the conceptual foundations from The Need for Systems Engineering, you will perform requirements analysis and functional analysis on engineering programs. You will learn how to perform a trade study using a methodical, quantitative approach that is universal in application. This course also covers preparing design reviews, focusing on coordinating the inputs of multiple engineering disciplines into a cohesive description of the design approach.

This course can be taken for academic credit as part of CU Boulder's Master of Engineering in Engineering Management (ME-EM) degree offered on the Coursera platform. The ME-EM is designed to help engineers, scientists, and technical professionals move into leadership and management roles in the engineering and technical sectors. With performance-based admissions and no application process, the ME-EM is ideal for individuals with a broad range of undergraduate education and/or professional experience. Learn more about the ME-EM program at <https://www.coursera.org/degrees/me-engineering-management-boulder>.

[Read less](#)

### Requirements and Performance Metrics

[Module details ^](#)

Module 1 • 5 hours to complete

We will begin the course by revisiting the topic of requirements. Now that we know what requirements are and how to write them, we will examine what requirements management is all about. On a long-duration development program, we also need a way to measure our progress from a technical standpoint toward requirement compliance. A great tool for this is to think of it in terms of Measures of Performance. At the tactical level on a design team, we will execute that by establishing a small number of Technical Performance Measures, or TPMs. These important performance attributes will keep the design team focused on the customer's most important requirements and they will help assess our progress toward meeting those objectives.

#### What's included

6 videos    4 readings    1 assignment    1 peer review    1 discussion prompt

[Hide info about module content ^](#)

[6 videos • Total 96 minutes](#)

[Introduction to the Specialization and Instructor • 10 minutes](#)

[Requirements Analysis and Management • 16 minutes](#)

[Specifications • 18 minutes](#)

[Requirements Verification Cross Reference Matrix • 17 minutes](#)

[Technical Measurement • 20 minutes](#)

[Using TPMs • 13 minutes](#)

## 4 readings • Total 159 minutes

Non-Credit Students: Welcome and Where to Find Help • 10 minutes

DOORS • 63 minutes

Jama • 26 minutes

INCOSE Technical Measurement Guide • 60 minutes

## 1 assignment • Total 10 minutes

Key Take Aways • 10 minutes

## 1 peer review • Total 60 minutes

Technical Performance Measures • 60 minutes

## 1 discussion prompt • Total 10 minutes

Introduce Yourself • 10 minutes

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## Design Reviews and Technology Readiness

[Module details ^](#)

Module 2 • 4 hours to complete

In this module, will begin by describing the overall design process by tying in the concepts that we have learned to date into something that can be planned and tracked during execution. We will then learn about the "Big Three" design reviews, namely the System Requirements Review, or SRR; the Preliminary Design Review, or PDR; and the Critical Design Review, or CDR. In addition to the reviews, the Systems Engineering process also incorporates a series of audits to ensure that the documentation is all squared away. The most commonly used audits are the Functional and Physical Configuration Audits, the FCA and PCA.

### What's included

 4 videos     3 readings     2 assignments

[Hide info about module content ^](#)

## 4 videos • Total 80 minutes

Design Reviews - General • 20 minutes

Design Reviews - The Big Three • 25 minutes

Audits • 14 minutes

TRA - the DoD Version • 19 minutes

## 3 readings • Total 185 minutes

Detailed Design Definition • 20 minutes

NASA System Design Processes • 90 minutes

NASA TRA Best Practices • 75 minutes

## 2 assignments • Total 20 minutes

Key Take Aways • 10 minutes

Key Take Aways • 10 minutes

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## Manufacturing Readiness and Trade Studies

[Module details ^](#)

Module 3 • 5 hours to complete

In this module, we will go over the topic of manufacturability. How do incorporate manufacturability considerations into the design process? It is considered so important that it has its own acronym, DFM, or Design for Manufacturability. We will also cover the process used for evaluating how ready a company is to scale up from low-volume development to high-volume production. In the second part of the module, we will learn about trade studies and how to conduct one.

### What's included

 5 videos     3 readings     2 assignments

[Hide info about module content ^](#)

## 5 videos • Total 101 minutes

Design for Manufacturing (DFM) • 23 minutes

Manufacturing Readiness Levels • 28 minutes

Trade Studies - The Process • 23 minutes

A Trade Study Example • 19 minutes

Cost as an Independent Variable (CAIV) • 7 minutes

**3 readings • Total 180 minutes**

DoD Manufacturing Management Program Guide • 60 minutes

DoD MRL Deskbook • 60 minutes

A Standard Approach to Trade Studies • 60 minutes

**2 assignments • Total 20 minutes**

Key Take Aways • 10 minutes

Key Take Aways • 10 minutes

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## Other Engineering Disciplines

[Module details ^](#)

Module 4 • 3 hours to complete

In this module, we are going to learn about what I call the "other engineering disciplines." I am going to group Software into this very loosely defined umbrella title with the hopes that I don't earn the ire of those who have chosen that as their profession. This is more a sign of my own lack of close familiarity with the discipline. I have learned that managing development programs that include a significant software effort deserves special consideration when it comes to coordinating software development with hardware development and properly allocating time and resources to get both sides of the development effort completed. I will also cover what I call "the -illities" or the engineering disciplines like Reliability, Maintainability and others. I may even work in a few F/A-18 stories along the way!

### What's included

2 videos    3 readings    1 assignment

[Hide info about module content ^](#)

**2 videos • Total 27 minutes**

Software Systems Engineering • 11 minutes

Other Engineering Disciplines • 15 minutes

**3 readings • Total 150 minutes**

Incorporating Software into Systems Engineering • 90 minutes

Systems Engineering and Quality Attributes • 15 minutes

System Reliability, Availability, and Maintainability • 45 minutes

**1 assignment • Total 10 minutes**

Key Take Aways • 10 minutes

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## Organization for Systems Engineering

[Module details ^](#)

Module 5 • 3 hours to complete

In this final module, we will look at how our most precious asset, our people, are assigned to a particular design effort. What are some of the important considerations that go into those decisions. We will also look at some of my favorite leadership traits from my time in the Marine Corps and how those can be applied to working in the aerospace industry. Systems Engineering is by nature a leadership role, at least at certain times, so it is important to think about leadership well before the moment we find ourselves in the spotlight.

### What's included

2 videos    3 readings    1 assignment

[Hide info about module content ^](#)

**2 videos • Total 32 minutes**

Teaming Organization • 21 minutes

Leadership • 11 minutes

 3 readings • Total 145 minutes

A Guide for Leading IPTs • 75 minutes

7 Key Principles for Program Success • 60 minutes

Interpersonal Communications • 10 minutes

 1 assignment • Total 10 minutes

Key Take Aways • 10 minutes



### Earn a career certificate

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### Build toward a degree

This course is part of the following degree program(s) offered by University of Colorado Boulder. If you are admitted and enroll, your completed coursework may count toward your degree learning and your progress can transfer with you.<sup>1</sup>

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## Instructor

Instructor ratings  5.0 ★ (8 ratings)



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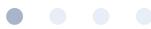
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### Frequently asked questions

#### ^ When will I have access to the lectures and assignments?

To access the course materials, assignments and to earn a Certificate, you will need to purchase the Certificate experience when you enroll in a course. You can try a Free Trial instead, or apply for Financial Aid. The course may offer 'Full Course, No Certificate' instead. This option lets you see all course materials, submit required assessments, and get a final grade. This also means that you will not be able to purchase a Certificate experience.

#### ^ What will I get if I subscribe to this Specialization?

When you enroll in the course, you get access to all of the courses in the Specialization, and you earn a certificate when you complete the work. Your electronic Certificate will be added to your Accomplishments page - from there, you can print your Certificate or add it to your LinkedIn profile.

#### ^ Is financial aid available?

Yes. In select learning programs, you can apply for financial aid or a scholarship if you can't afford the enrollment fee. If fin aid or scholarship is available for your learning program selection, you'll find a link to apply on the description page.

#### More questions



[Visit the learner help center](#)

Financial aid available, [learn more](#)

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Examples of Strengths and Weaknesses for Job Interviews

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| Microsoft Excel       | IBM Data Science Certificate                | Healthcare                  | How to Learn Artificial Intelligence          |
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