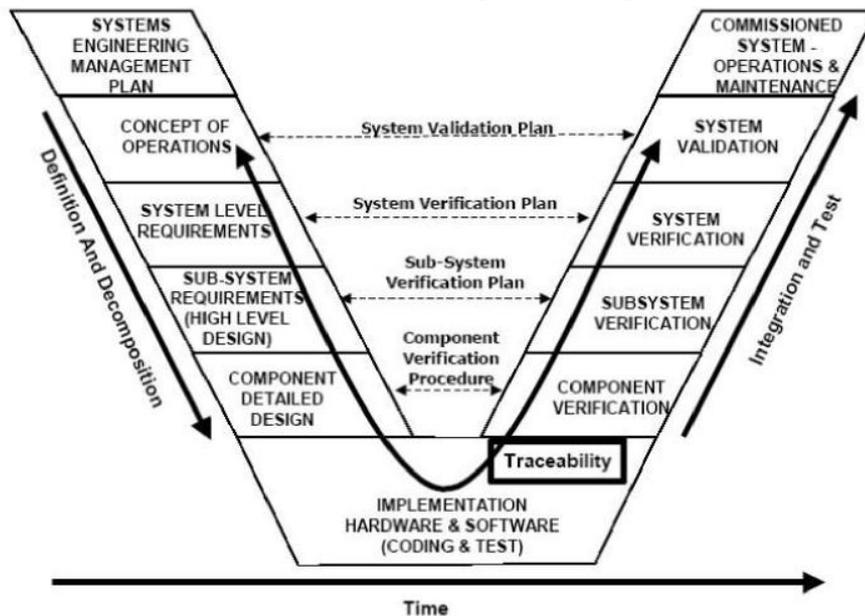


## Systems Engineering Vee



**COURSE NUMBER AND TITLE:** EE461: Systems Engineering and Program Management

**COURSE PREREQUISITE:** Junior, Senior or Graduate student status.

**FACULTY NAME:** Chuck Boehmer

### **ABOUT THE INSTRUCTOR:**

I am Chuck Boehmer and have taught this course since 2002. I am a retired naval aviator and a retired senior program manager and systems engineer from both Lockheed Martin in Sunnyvale, CA and General Dynamics C4 Systems. I have over 35 years of Program Management and Systems Engineering experience in the government and industry. My education consists of a BA in pre-med from Gonzaga University, a Masters in Aeronautical Engineering and a Masters in Material and Financial Management from the US Naval Postgraduate School. I am also a graduate of the Navy Test Pilot School and the Kennedy School of Government (short course) at Harvard.

Your teaching assistant (TA) is Theodoros (Theo) Alexopoulos. Theo received his Diploma (Integrated B.S./M.S. Degree) in Electrical and Computer Engineering from the National Technical University of Athens, Greece in 2012. Currently, he is a second year Ph.D. student in the Klipsch School of Electrical and Computer Engineering of New Mexico State University. His research interests lie in the intersection of several fields of Power Engineering, including power system protection, power delivery automation, state estimation, synchrophasor measurement systems, and communication-aided power system applications. His email is [thalex@nmsu.edu](mailto:thalex@nmsu.edu)

Theo has been with me for two years and is an excellent TA

## OFFICE HOURS AND LOCATION

I am available for consultation or questions on Skype or phone on request by email (See Contacting the Instructor below)

**TELEPHONE NUMBER:** 575-635-3910

**EMAIL ADDRESS:** [cboehmer@nmsu.edu](mailto:cboehmer@nmsu.edu)

## CONTACTING THE INSTRUCTOR

1. The best way to contact me is through my NMSU email. I am always available to discuss your progress and/ or grades. I will be reading and answering my email at least once per day. I usually check my email late in the evening and then again in the morning. So if you send a message late, please check it for a response after a little while! I might well have seen it and responded! I also check my messages just as frequently during the weekend. If I am going to be on travel, I will mention that in a message so you will be aware of slow response times.
2. You also can leave messages on my cell phone 575-635-3910. However, I do not check that as often, so there could be a bit of a lag. My NMSU email is your best bet to contact me.

**REQUIRED TEXT:** None. The instructor's lecture notes take the place of a textbook.

## INSTRUCTIONAL MATERIALS:

**OPTIONAL REFERENCE BOOK:** INCOSE Systems Engineering Handbook

Haskins, C. (2011). *Systems engineering handbook: A guide for system life cycle processes and activities* (Ver. 3.2.1. ed.). San Diego, Calif.: INCOSE.

This is an excellent reference book from the principle organization for systems engineering  
VIDEOS:

**“7 Student Skills” by Dr. Tony Wagner** – You Tube -

<https://www.youtube.com/watch?v=NS2PqTTxFFc>

**“How Not To Be Stupid – A Guide To Critical Thinking by Carrie Burttt** – You Tube -

[https://www.youtube.com/watch?v=\\_9BMyaftZ1A](https://www.youtube.com/watch?v=_9BMyaftZ1A)

**“An Introduction to Critical Thinking” by Crazy Phillips** – You Tube -

[https://www.youtube.com/watch?v=oefmPtsV\\_w4](https://www.youtube.com/watch?v=oefmPtsV_w4)

**“So You Want To Be A Systems Engineer”** by Dr. Gentry Lee, JPL, Pasadena, CA, 2001 -

[https://www.youtube.com/watch?v=E6U\\_Ap2bDaE](https://www.youtube.com/watch?v=E6U_Ap2bDaE)

**“When The Canvas Is Blank”** by Dr. Gentry Lee, Jet Propulsion Laboratory, Pasadena, CA, 2006

## COURSE DESCRIPTION AND PURPOSE:

**Systems engineering** is an interdisciplinary field of engineering that focuses on how to design and manage a complex engineering project over its life cycle. Systems engineering involves working with work-processes, optimization methods, and risk management tools. It overlaps technical and human-centered disciplines such as control engineering, industrial engineering,

organizational studies, and project management. Systems Engineering ensures that all likely alternatives and options for a project or system are considered, and integrated into a whole. Program Management is the active process of managing the technical performance, risk, cost and schedule of a complex system which might contain many projects or the creation of many subsystems.

This course is designed to give you an overview of Systems Engineering and Program Management from a major program perspective including the societal impacts of engineering solutions to today's problems. The course demonstrates the systems engineering discipline that is required to establish an effective configuration and size of system hardware, software, facilities, and personnel through an interactive process of analysis and design, satisfying an operational mission need in the most cost effective manner. The course provides a guide for systems engineering functions in program development, fabrication, operations, maintenance and life cycle support. You will also learn the fundamentals and principles of program management including program structure, cost and schedule control, staffing and subcontract and contract management. We will also address the professional and ethical responsibilities of managing a major program.

### **COURSE STRUCTURE:**

As this is a required course for Electrical Engineering, you are required to attend it in a classroom. As mentioned below, the TA will take attendance for each class. I will use a variety of techniques to facilitate your educational experience. Please note that you will need a computer, a browser (Chrome or Firefox work best with Canvas), Microsoft Office or equivalent and a reliable Internet connection (See Technical Resources Required below). You will also need a basic knowledge of Canvas, know how to download and upload files, how to use a browser and search engine. Your computer skill level is adequate if you are competent with email and preparing Office documents. So here's how we will work the class for this semester:

1. You will have access to the Tuesday and Thursday video lecture, notes and a short quiz on the Friday before the Tuesday class. You are to view the lecture, and turn in the quiz on Canvas prior to 4pm on the day of the class.
  - a. The online quizzes will be worth 20% of your grade. They are due every Tuesday and Thursday by 4pm. No late submissions will be accepted
2. During each class period (4pm to 5:15pm on Tuesdays and Thursdays), you will discuss the answers to the online quiz as a group, you will work on systems engineering process examples regarding requirements analysis, functional analysis, design, verification and validation and integration and test. The TA will also go through a sample Case Study with you. Your attendance in these classes is important if you want to earn a good grade. See Attendance below.
3. You will also be required to write papers throughout the semester. Each paper will be a minimum of 500 words and a maximum of 1000 words. The topics and due date of each paper will be listed in the appropriate Module and Topic and in Canvas under Assignments. The purpose of these papers is to further your knowledge in the practice

of Systems Engineering and to apply what you have learned. The rubric for written work is in the Introductory Module under Rubrics.

4. You will also be required to analyze a case study. There is a rubric for this in the Introductory Module under Rubrics. This analysis is worth 20% of your grade. Much more on this subject later.
5. There will be 2 exams. The first exam will be on October 15<sup>th</sup> from 4:00pm to 5:15pm. The second exam will be on December 3<sup>rd</sup> from 4:00 to 5:15pm. Please make sure that you will be available for these exams. There will be no makeup exams given.

**Note:**

- **There is a maximum score of 105% available. There will be no additional bonus assignments given.**
- **If you want an A in this class, you must earn it. So start on the first day of class earning your grade. I will not increase your score or give you a grade that is not earned. So do not ask. If you get an 89.8, you receive a B+, not an A. If I make a mistake calculating your grade, I will be more than happy to change it.**
- **Late assignments cannot be accepted after their respective due dates. In the case of well documented illnesses, exceptions may be made.**

**Attendance Policy**

Much of what you will learn this semester will be learned in the classroom in discussions with other students and the TA. The following are penalties to your grade that will be imposed:

- 3 or less absences – no penalty
- 4 to 5 absences – 5% penalty on your total score
- 6-8 absences – 10% penalty on your total score
- 8 to 9 absences - 15% penalty on your total score
- 10 to 12 absences – 20% penalty on your total score
- More than 12 – 100% penalty giving the student a grade of F

**Example: If your final score is 93 (an A) and you missed 5 classes, then your adjusted score is  $93 \times 0.95 = 88.35$  (a B+). So please think twice about missing a class.**

**RESPONSE TIME FOR FEEDBACK**

I recognize your desire for, and educational value of, timely and succinct feedback on your work in this course.

1. Homework will be graded within 7 days but not returned. If you receive an A (90 to 100) or a B (80 to 89), you will receive no feedback. If you received a C or less, you will receive feedback on how to improve your score.

2. Discussions will be graded within 7 days and comments may be given. If you follow the rubric, give due diligence to the question, and provide feedback to one other class mate, you will receive full credit.
3. You will receive feedback on the 2 exams within 3 days after the exam is taken.
4. You will receive feedback on your project within 10 days.

## **RUBRICS**

Rubrics for Discussions, the Project Brief, and Homework Papers can be found in Canvas in Module 1 – Getting Started in Systems Engineering and Program Management

## **COURSE LEARNING GOALS**

Students who successfully complete this course will be able to:

- Goal 1 – Explain and apply the fundamentals and “best practices” of systems engineering to all phases of the system life cycle
- Goal 2 – Explain and apply the fundamentals and “best practices” of successful program management
- Goal 3 – Implement the fundamentals of Team Based Learning into the team project
- Goal 4 – Critique engineering legal and ethical behaviors in the workplace and business settings

## **PROGRAM EDUCATIONAL OBJECTIVES FOR EE**

The program educational objectives for the Department of Electrical Engineering are:

- Objective 1 – Our graduates will obtain relevant, productive employment in the private sector, government, and/or pursue an advanced degree.
- Objective 2 – Our graduates will be using their engineering foundation to innovate solutions to the problems of the real world.

## **THE STUDENT OUTCOMES FOR THE BACHELOR OF SCIENCE PROGRAM IN ELECTRICAL ENGINEERING ARE:**

Graduates in Electrical and Computer Engineering will be capable of:

1. applying knowledge of mathematics (including probability and statistics, differential and integral calculus, differential equations, linear algebra, and complex variables); science (chemistry, physics, and computer science) and engineering to the design and/or analysis of analog and digital circuits, signals and systems, electromagnetics, and electric power systems. (3a)
2. designing and conducting experiments to simulate, test, validate, and/or verify.
3. designing a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political,

- ethical, health and safety, manufacturability, and sustain- ability.
4. functioning effectively on teams (3d)
  5. identifying, formulating, and solving engineering problems (3e)
  6. an understanding of professional and ethical responsibility (3f)
  7. communicating effectively (3g)
  8. understanding the impact of engineering solutions in a global, economic, environmental, and societal context (3h)
  9. recognizing the need for, and engaging in life-long learning (3i)
  10. maintaining a knowledge of contemporary professional, societal and global issues (3j)
  11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. (3k)

## **CITATIONS FOR COURSE MATERIALS**

### **ALL COURSE VIDEO LECTURES AND POWER POINT LECTURE NOTES**

Boehmer, Charles E. (2014). New Mexico State University Course Systems Engineering and Program Management

Gentry Lee's So You Want to be a Systems Engineer? (2005.). Retrieved from NASA's Space Systems Engineering page <http://space.se.spacegrant.org/index.php?page=videos>

Gentry's Lee's When the Canvas is Blank (2007). Retrieved from NASA's Space Systems Engineering page <http://space.se.spacegrant.org/index.php?page=videos>

Dr. Tony Wagner's 7 Skills Students Need For Their Future. (2001) Retrieved from YouTube <https://www.youtube.com/watch?v=NS2PqTTxFFc>

### **MODULE LEARNING OUTCOMES:**

Learning outcomes for individual modules will be placed in Canvas in that module under the title "Learning Outcomes".

### **HOW YOUR LEARNING WILL BE MEASURED**

Your understanding and ability to explain terminology, advanced systems engineering and program management concepts and issues, and social and ethical issues will be measured by applying scoring rubrics to your Writings, Discussion postings, Team Project Briefings, and Examinations. The rubrics used to score these work products are at the Rubrics section of Module 1. Please review these rubrics carefully before doing the work and then review the scoring. If you have questions, please do ask immediately!

**PERFORMANCE AREAS:**

The grades will be determined by combining scores in the following required activities: Examinations, Team Project Briefings, Discussions and Homework.

<b>Performance Activities</b>	<b>Percentage of Grade</b>
Exam	20%
Case Analysis	20%
Discussions	40%
On-Line Quizzes	20%
Bonus	5%
Attendance	See above

**LETTER GRADE ASSIGNMENT:**

At the completion of the scoring for the semester, your numeric score will be converted to a letter grade using the following brackets.

<b>Lower and Upper Bounds</b>	<b>Letter Grade</b>
98 to 100	A+
93 to 97.9	A
90 to 92.9	A-
88 to 89.9	B+
83 to 87.9	B
80 to 82.9	B-
70 to 79.9	C
60 to 69.9	D
Less than 60	F

**ACADEMIC INTEGRITY:**

Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. You should refer to page 3 of the Student Code of Conduct

[Student Handbook \(http://studenthandbook.nmsu.edu/\)](http://studenthandbook.nmsu.edu/)

## **INCOMPLETE GRADES:**

A grade of "I" (Incomplete) will be assigned only in circumstances in agreement with the current NMSU Undergraduate Catalog. Incomplete grades are to be given only if a student has passed the first half of the course and is unable to complete the course due to circumstances beyond the student's control. (If the circumstances develop during the first half of the course, the student has the opportunity to drop the class.) Examples of appropriate circumstances are documented illness, documented death or crisis in the student's immediate family and similar circumstances. The catalog states that job related circumstances are generally not appropriate grounds for assigning an "I" grade and that this grade is not to be used to avoid assigning a D, F, or U grade.

## **MAKE-UP EXAM POLICY:**

There will be two examinations during the semester. No makeup examinations are planned, but it is important to contact the instructor as soon as possible to discuss your grade computation should you have to miss an examination for health or family emergency reasons. If you are absent because you are on an official NMSU trip and you are unable to access Canvas, contact the instructor ahead of time or as soon as possible to determine makeup procedures. A University approved excuse will be required for an absence to be excused.

## **NETIQUETTE:**

**Please make sure you read the following carefully before responding to a classmate's discussion. I expect everyone to follow this netiquette carefully.**

**[Netiquette](https://nmsu.instructure.com/courses/853591/wiki/netiquette)** (<https://nmsu.instructure.com/courses/853591/wiki/netiquette>)

## **TECHNICAL RESOURCES REQUIRED:**

**Minimum Technical Skills Required:** You will a basic knowledge of the Canvas learning management system, know how to download and upload files to Canvas, know how to use a browser and search engine (Canvas technical support recommends the use of Chrome or Mozilla Firefox as browsers), and have connection to the University's Canvas system in the cloud. This can be through a home connection (dialup, DSL, cable modem, etc.) or through computers in the University's computer labs. You will also need to install Adobe Reader and Adobe Flash on your computer (See below).

The Canvas Learning Management System at [learn.nmsu.edu](http://learn.nmsu.edu) has links that will test your browser for compatibility with Canvas. Flash video content is used requiring the Flash player to be installed on your computer. It may be downloaded at <https://www.adobe.com/support/flashplayer/downloads.html>

Also, Adobe Reader is required to view PDF files and may be downloaded at <https://get.adobe.com/reader/>

You will also be using Adobe Connect to view the class lectures. This program will automatically connect when you click on the lecture link. If the program states that an add-in is required, let the system add it.

Adobe's privacy policy for Reader, Flashplayer and Connect may be found at <http://www.adobe.com/privacy.html>

## **STUDENT ACCESSIBILITY SERVICES**

You Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) cover issues relating to disability and accommodations. If you have questions or need an accommodation (all medical information is treated confidentially), contact Trudy Luken, Director of Student Accessibility Services (SAS) in the Corbett Center, Room 244. Her phone number is 575-646-684. Email: [sas@nmsu.edu](mailto:sas@nmsu.edu). Website: [www.nmsu.edu/~ssd](http://www.nmsu.edu/~ssd).

**NMSU policy prohibits discrimination** on the basis of age, ancestry, color, disability, gender identity, genetic information, national origin, race, religion, retaliation, serious medical condition, sex, sexual orientation, spousal affiliation and protected veterans status.

**Furthermore, Title IX prohibits sex discrimination** to include sexual misconduct, sexual violence, sexual harassment and retaliation.

For more information on discrimination issues, Title IX or NMSU's complaint process contact:

Gerard Nevarez, Executive Director or Agustin Diaz, Associate Director  
Office of Institutional Equity (OIE)  
O'Loughlin House

**Phone:** (575) 646-3635

**E-mail:** [equity@nmsu.edu](mailto:equity@nmsu.edu)

**Website:** <http://www.nmsu.edu/~eeo/>

## **OTHER ACCESSIBILITY SERVICES**

Explanation of Accessibility - <https://www.youtube.com/watch?v=dod7tF9E3GA>

Mozilla Firefox - <https://support.mozilla.org/en-US/kb/accessibility-features-firefox-make-firefox-and-we>

Safari - <http://www.apple.com/accessibility/resources/>

Google - <http://www.apple.com/accessibility/resources/>

Web Accessibility Evaluation Tool - <http://wave.webaim.org/>

Canvas Accessibility - <http://www.instructure.com/accessibility>

Adobe Connect - <http://www.adobe.com/accessibility/products/adobeconnect.html>

Adobe Reader - <http://www.adobe.com/accessibility/products/acrobat.html>

## **ACADEMIC HONESTY**

Students taking this course agree that all work will be achieved through personal merit and without any unauthorized aid from others. If there are any questions or concerns about this policy, it is the student's responsibility to ask for clarification. Reading these words as part of the course syllabus indicates that you understand and agree to this statement of academic

honesty.

### **ACADEMIC MISCONDUCT**

Students should familiarize themselves with the NMSU Student Code of Conduct (Section 2 of the NMSU Student Handbook). Any violation of the Student Code (e.g. plagiarism, cheating, etc.) will result in the student receiving a grade of "F" in this course. If you do not have a Student Handbook, this information is available at: [Student Handbook](http://deanofstudents.nmsu.edu/student-handbook/) (<http://deanofstudents.nmsu.edu/student-handbook/>)

## **AVAILABLE STUDENT SUPPORT SERVICES**

### Technical Support Services

#### **Canvas Support**

<http://guides.instructure.com/m/4212>

NMSU has set up a Canvas page with a HELP link in the upper right hand corner of the opening page of Canvas. You may also view FAQ at <http://studenttech.nmsu.edu/faqs-for-students>. You may also receive support by going to Rm 80 in Milton Hall.

#### **Information and Communication Technologies (ICT)**

<http://ict.nmsu.edu/>

The ICT Help Desk may be reached at 575-646-1840 (email [help@nmsu.edu](mailto:help@nmsu.edu)) for technical help with email, browser, and computer problems

### Student Support Services

Student Accessibility Center - <http://sas.nmsu.edu>

Here you will find a variety of services to students with documented physical, learning, or psychological disabilities. Please feel free to drop by the SAS office or contact them for additional information at 575-646-6840

Student Success Center - <http://ssc.nmsu.edu/>

NMSU's Student Success Center is a centralized, university-wide academic support service for students from all disciplines, and at all levels of academic standing. The purpose of the center is to help you maximize your learning potential and get better grades. The Student Success Center can help you develop the skills you need to excel in college. The Success Center is located in Corbett Hall, Rm 148. The phone number is 575 646-3136.

#### Academic Support Services

NMSU Writing Center – <http://english.nmsu.edu/resources/writingcenter>

The Writing Center strives to help students become more knowledgeable, practiced, and confident writers through collaborative, dialogue-centered consultations. Use them.

Tutorials

Canvas Orientation – <https://training.instructure.com/courses/347469/modules>

If you need to learn more about Canvas

Canvas Tutorials – <http://studenttech.nmsu.edu/learnnmsuedu/>

If you need to refresh your knowledge of Canvas

**Note:** Monday, **October 19, 2015**, is the last date that you may withdraw from the course with a “W”.

**The instructor may revise this syllabus by written addenda at any time.**