EM 612
Project Management of Complex Systems

Stevens Institute of Technology
School of Systems and Enterprises
Castle Point on Hudson
Hoboken, NJ 07030

Fall 2022

Instructor: John Mikruk
Course Web Address: https://sit.instructure.com/
Course Schedule: Monday-Sunday
Credit Hours: 3
Contact Info: jmikruk@stevens.edu
Virtual Office Hours: Thursday afternoons from 5:00-6:00 pm EST
Virtual session URL: Go to the "Zoom" tab on the left-hand navigation bar to access live virtual sessions for this course

COURSE DESCRIPTION

Project Management of Complex Systems is a project-based course that exposes students to tools and methodologies useful for the effective management of systems engineering and engineering management projects. This course presents the tools and techniques for project definition, work breakdown, estimating, resource planning, critical path development, scheduling, project monitoring, and control, scope management, risk management and earned value. Reinforcing these fundamentals in project management, the course will introduce advanced concepts in project management, and establish the building blocks for the management of complex systems.

STUDENT LEARNING OUTCOMES

After successful completion of this course, students will be able to…

- Evaluate guidelines, principles, and tools of project management.
- Analyze factors in creating a project organization, culture, and team.
- Adapt quantitative techniques to project planning, risk, performance, and monitoring, including stakeholder management.
- Differentiate between waterfall and agile development benefits and costs in specific environments involving both software and hardware development as well as top-down versus distributed management hierarchical control structures.
- Examine interdependencies in the project management of complex systems versus those in obvious, complicated, and chaotic systems using an analytical framework.

COURSE FORMAT AND STRUCTURE

This course is fully online. To access the course, please visit stevens.edu/canvas . For more information about course access or support, contact the Technology Resource and Assistance Center (TRAC) by calling 201-216-5500.

Course Logistics

- Modules will run from Monday to Sunday. I will post information (online activities, discussion starters, etc.) for the upcoming week by Sunday evening so that when you log in on Monday, you can begin the new week.
- All assignments are due by 11:59 p.m. EST on the due date listed in the course schedule.
- Deadlines are an unavoidable part of being a professional and this course is no exception. Course requirements must be completed and posted or submitted on or before the specified due date and delivery time deadline. Due dates and delivery time deadlines are defined as Eastern Standard Time (as used in Hoboken, NJ). Please note, students living in distance-time zones or overseas must comply with this course time and time and due date deadline policy. To encourage you to stay on schedule, due dates have been established for each assignment; 20% of the total points will be deducted for late assignments. The solution of each assignment will be made available a week after the due date and no assignment papers will be accepted after that.

Instructor's Online Hours

I will be available via email and will respond within 24-48 hours. I intend to check the online discussion two times per week. However, it is not possible for me to respond to every single posting every week, but I will make every effort to respond to major questions and shared problems either in a direct posting or during our weekly meetings. You are encouraged to use the specific discussion forum to ask questions or to call my attention to a particular question and issue requiring further clarification. When emailing me, please place in the subject line the course number/section and the topic of your email, which will help me in locating your emails quicker and properly associating all emails from this class.

Virtual Office Hours

Virtual Office Hours are a synchronous session (through Zoom) to discuss questions related to weekly readings and/or assignments. Office hours will be held Thursday evenings from 5:00-6:00 pm EST. Go to the “Zoom” tab on the left-hand navigation bar to access live virtual sessions for this course.

Online Etiquette Guidelines

Your instructor and fellow students wish to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Our differences, some of which are outlined in the University's inclusion statement below, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambience. Please read the Netiquette rules for this course:

- Do not dominate any discussion. Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Keep an “open-mind” and be willing to express even your minority opinion.
- Think and edit before you push the “Send” button.
- Do not hesitate to ask for feedback.

TENTATIVE COURSE SCHEDULE

Assigned work must be submitted by 11:59 pm Sunday.

		Readings	Assignment
1	Overview of Project Management	Why Project Fail? “Why Your Business Success Depends on Projects”, Shenhar and Dvir, Reinventing Project Management, pg 3-19 Hobday,, rush, Tidd (2000) Innovation in complex products and system. Research Policy 29:793-804 (optional) “Denver International Airport (DIA),” PM case studies, Kerzner, pg 517	

2	System Engineering and Bounding Project Scope	What Makes a Project Successful? Shenhar and Dvir, Reinventing Project Management, pg 21-36 "The Diamond Approach," Shenhar and Dvir, Reinventing Project Management, 37-59 Carr (2000) Requirements engineering and management: the key to designing quality complex systems. The TQM Magazine 12(6):400-407(optional)	
3	Work Breakdown Structure	Technology - Shenhar and Dvir Reinventing Project Management pg 79-100	Part 1 DIA- WBS
4	Organizing for PM Organizational Structures	Hobday (2000) The project-based organization: an idea form for managing complex products and systems? Research Policy 29:871-893 (optional)	DIA Part 1 Due
5	Project Planning	Complexity - Shenhar and Dvir, Reinventing Project Management pg 101-121 Pace - Shenhar and Dvir, Reinventing Project Management pg 123-135 Jolivet and Navarre (1996) Large-scale projects, self-organizing and meta-rules: towards new forms of management. International Journal of Project Management (optional) Ivory and Alderman Can Project Management Learn Anything from Studies of Failure in Complex Systems? Project Management Journal 14(5):265-271(optional) Part 2 DIA Logic Diagram and Gantt	Review reading Pace Shenhar and Dvir Reinventing Project Management pg 123-135
6	Estimating and Budgeting	Managing Projects for Business Innovation Shenhar and Dvir,	DIA Part 2 Due

		Reinventing Project Management, pg 139-160 Floricel And Miller(2001) Strategizing for anticipated risk and turbulence in large-scale engineering projects. International Journal of Project Management 19:445-455 (optional) Part 3 DIA- Effort and Time Cost	
7	Decisions Framework		DIA Part 3 Due
8	Risk and Opportunity Management	Appendix 4,5A & 5B of Shenhar and Dvir, Reinventing Project Management Miller and Lessard (2001) Understanding and managing risk in large engineering projects. International Journal of Project Management19:437-443 (optional) Part 4 DIA Risk Management	Review Appendix 4 & 5
9	Contracting and Sub-contracting	"Reinventing Project Management for your organization" - Shenhar and Dvir, Reinventing Project Management pg 205-213 Eriksson and Lillieskold (2002) Project Management Competence Requirements when procuring Complex Systems IEEE. (optional)	DIA Part 4 Due
10	Project Assessment and Control	"Managing Projects Within the Existing Organization," Shenhar and Dvir, Reinventing Project Management 161-187 Glass (1996) Chaos, Non-Linear System and Day to Day Management European Management Journal 14(1):98-106(optional)	Shea Stadium Project Due
11	Leading and managing the Project Team	Novelty Shenhar and Dvir, Reinventing Project Management, pg 63-78	Earned Value Homework Due

		Davies and Brady (2000) Organizational capabilities and learning in complex product systems: towards repeatable solutions Research Policy 29:931-53(optional)	
12	Project Quality Management	"How Markets and Industries Affect Project Management ," Shenhar and Dvir, Reinventing Project Management 189-203 Hobday (1998) Product complexity, innovation and industrial organization. Research Policy 26:689-710 (optional)	Review "How Markets and Industries Affect Project Management ," Shenhar and Dvir, Reinventing Project Management, pg 189-203
13	Evaluating and closing out a Project	Appendix 6A,6B & 7, Shenhar and Dvir, Reinventing Project Management Williams (1999) The need for New paradigms for complex projects International Journal of Project Management 17(5):269-273(optional)	Review Appendix 6 & 7
14	Business Ethics and Law	Enron Video	Final NCTP Project Due
Module	Topic(s)		

COURSE MATERIALS

Textbook(s):

- **Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation**, Harvard Business Press, ISBN: 978-1-59139-800-4

Optional Readings:

Optional Reading

- Hobday M, Rush H, Tidd J. Innovation in complex products and system. *Research policy*. 2000;29(7-8):793-804. (Stevens Library link: https://ezproxy.stevens.edu:2056/science/article/pii/S0048733300001050)

- Carr. Joseph J. Requirements engineering and management: the key to designing quality complex systems. *The tqm magazine*. 2000;12(6):400-407. (Not downloadable from Stevens Library)

- Jolivet F, Navarre C. Large-scale projects, self-organizing and meta-rules: towards new forms of management. International journal of project management. 1996;14(5):265-271. (Stevens Library link: https://ezproxy.stevens.edu:2056/science/article/pii/0263786396845091)

- Hobday (2000) The project-based organization: an idea form for managing complex products and systems? Research Policy 29:871-893

- Ivory and Alderman Can Project Management Learn Anything from Studies of Failure in Complex Systems? Project Management Journal 14(5):265-271

- Eriksson and Lillieskold (2002)Project Management Competence Requirements when procuring Complex Systems IEEE.

- Floricel And Miller(2001) Strategizing for anticipated risk and turbulence in large-scale engineering projects. International Journal of Project Management 19:445-455

- Glass (1996) Chaos, Non-Linear System and Day to Day Management European Management Journal 14(1):98-106

- Davies and Brady (2000) Organizational capabilities and learning in complex product systems: towards repeatable solutions Research Policy 29:931-53

- Hobday (1998) Product complexity, innovation and industrial organization. Research Policy 26:689-710

- Williams (1999) The need for New paradigms for complex projects International Journal of Project Management 17(5):269-273

COURSE REQUIREMENTS

As you move through the topics in each module, rather than simply viewing lecture content, you will be asked to read, listen to, and watch a variety of media. You'll also be regularly prompted to actively evaluate your knowledge as you're building it.

The components in each module are designed to be completed sequentially in order. In addition to videos, readings, and interactives, we want to bring your attention to a few types of learning activities you'll encounter.

- **Discussion Board**: In many modules, you'll find detailed discussion prompts where you are invited to post a video and/or written response, as well as comment on your classmates' posts. These discussions may be non-graded or graded.

- **Live Sessions**: Live sessions are scheduled in each module. In some sessions, you will work collaboratively with your classmates to solve a problem. In others, you'll work through hands-on virtual labs to help you complete your lab assignments.

- **Homework Assignments**. In selected modules, you will complete open-ended individual assignment questions based on assigned readings.

- **Group Presentations**: In selected modules, you will work collaboratively with your classmates to present on selected project management topics. The content of group presentations follows a project lifecycle arc.

- **Office Hours**: Use this time to ask your instructor about any concepts you are struggling with, difficulties with assignments, or to simply share something relevant to the class you encountered this week.

TECHNOLOGY REQUIREMENTS

Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Canvas

Technology skills necessary for this specific course

- Live web conferencing using Zoom

Required Equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

Required Software

- You will need to access Microsoft Project

GRADING PROCEDURES

Grades will be based on:

Assignment/Assessment	Competency & Behavior	Percentage of Final Grade	Due Date
Team Presentations		**45%**	
Team Project Denver International Baggage System	CO6	20%	M4
Team NCTP	CO5	25%	M9
Homework Assignments		**35%**	
Individual Homework in Module Earned Value	CO1	10%	M5
Individual Homework in Module Shea Stadium Project	CO4	25%	M6
Discussion Board		**10%**	
Alaskan Pipeline Summary	CO1	5%	M4
Discussion in Module Enron	CO1	5%	M4
Live Session Participation	**All**	**10%**	**M1-M13**
	TOTAL:	**100%**	

Late Policy

To encourage you to stay on schedule, due dates have been established for each assignment; 20% of the total points will be deducted for late assignments. The solution of each assignment will be made available a week after the due date and no assignment papers will be accepted after that.

Academic Integrity

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at www.stevens.edu/provost/graduate-academics.

LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/office-disability-services. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone 201-216-3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments can be made by phone (201-216-5177).

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text "Home" to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu. A member of the CARE Team will respond to your concern as soon as possible.