

W.Booth School of Engineering Practice
&Technology
PROCTECH 2SE3
Systems Engineering Fundamentals
Winter 2024



ENGINEERING

Instructor Information

Konstantinos Apostolou
Email: apostol@mcmaster.ca
Office: ETB/213
Office Hours:
TBD

Class Times

Monday 4:30pm - 6:20pm
Tuesday 2:30pm - 3:20pm

Class Format

In Person.

In-person attendance is required for this course, as there will be in-class assessment components.

Course Dates: 01/08/2024 - 04/10/2024

Units: 3.00

Course Delivery Mode: In Person

Course Description: This course covers the principles of systems engineering and their application across systems life cycle. Emphasis is given to concept exploration, requirements analysis, development, operation, and retirement of complex automation

systems. Three lectures; second term Prerequisite(s): Registration in level II or above of Automation Systems Engineering Technology.

Important Links

- [Mosaic](#)
- [Avenue to Learn](#)
- [Student Accessibility Services - Accommodations](#)
- [McMaster University Library](#)
- [eReserves](#)

Course Learning Outcomes

- Establish an understanding of basic system and systems engineering concepts and terms.
- Define the System Development Life Cycle and how the Systems Engineering process is applied across that Life Cycle.
- Describe the fundamental Systems Engineering activities including Requirements Analysis, Functional Definition, Physical Definition, and Design Validation.
- Differentiate between the types of system requirements and apply techniques for writing good requirements.
- Identify, analyze, assess, and write risks and their mitigations.
- Demonstrate how to proactively design for and manage system lifecycle targets.
- Apply systems engineering practices and methods to relevant examples

Graduate Attributes

N/A

Course Schedule

A weekly breakdown of the course schedule

Week	Topic	Assessment
1	Introduction to Systems Engineering	
2	Systems Engineering Overview – Lifecycle Stages	
3	System Engineering Methodologies and System Types	
4	Stakeholder Needs and Requirements Definition Process	
5	Requirement Analysis	
6	System Concept Generation – Design	
Midterm Break		
7	Term Test	
8	System Design Evaluation and Selection	
9	System Integration and Interface Management	
10	Verification and Validation	
11	Commissioning & Operations – Prototype Manufacturing	
12	Risk Assessment & Lifecycle Management	
13	Review	

Note that this structure represents a plan and is subject to adjustment term by term.

The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.

Required Materials and Texts

Textbook Listing: <https://textbooks.mcmaster.ca>

NASA Systems Engineering Handbook

Publisher: National Aeronautics and Space Administration

Publication Date: December 2017

https://www.nasa.gov/wp-content/uploads/2018/09/nasa_systems_engineering_handbook_0.pdf

Systems engineering handbook : a guide for system life cycle processes and activities

ISBN: 978111981429

Authors: Walden, D. D. (Ed.)

Publisher: John Wiley & Sons

Publication Date: 2023

Edition: 5th

https://mcmaster.primo.exlibrisgroup.com/permalink/01OCUL_MU/deno1h/alma991033783964007371

Optional Course Materials

Textbook Listing: <https://textbooks.mcmaster.ca>

The Engineering Design of Systems: Models and Methods

ISBN: 978-1-119-02790-4

Authors: Dennis M. Buede, William D. Miller

Publisher: John Wiley & Sons

Publication Date: February 2016

Edition: 3rd

Systems Engineering Principles and Practice

ISBN: 978-1-119-51666-8

Authors: Alexander Kossiakoff, Steven M. Biemer, Samuel J. Seymour, David A. Flanigan

Publisher: John Wiley & Sons

Publication Date: June 2020

Edition: 3rd

Course Evaluation

Assessment	Weight
In-class or online activities & quizzes	25%
Team Project	20%
Term Test	20%
Final Exam	35%
TOTAL	100%

Grading Scale

The McMaster 12 Point Grading Scale

Grade	Equivalent Grade Point	Equivalent Percentages
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49

Absences, Missed Work, Illness

Exams:

Absence from a test without an approved MSAF will result in a grade of zero for the test. If an approved MSAF is submitted, the weight of the missed test will be added to the final exam's weight.

Quizzes or in-class Activities:

Some quizzes and activities will be on-line asynchronous and some will be announced in-class synchronous ones. Absence from any quiz without an approved MSAF will result to a grade of zero for that quiz. A submitted MSAF for an asynchronous on-line element will be accommodated by extending the submission window for that quiz. A submitted MSAF for an in-class synchronous element will be accommodated either by distributing the weight of the quiz to the remaining in-class quiz components. Submission of multiple MSAFs for in-class synchronous elements might result in alternative assessment or in weight transfer to other course elements at the discretion of the instructor.

Team/Group work elements:

MSAFs cannot be used to postpone group/team work elements. Plan your work so that you do not depend on the last-minute contribution of a group member. Challenges with group members' commitment to group work must be discussed with the course instructor as soon as they become apparent.

Generative AI: Some Use Permitted

Students may use generative AI for [editing/translating/outlining/brainstorming/revising/etc] their work throughout the course so long as the use of generative AI is referenced and cited following citation instructions given in the syllabus. Use of generative AI outside the stated use of [editing/translating/outlining/brainstorming/revising/etc] without citation will constitute academic dishonesty. It is the student's responsibility to be clear on the limitations for use and to be clear on the expectations for citation and reference and to do so appropriately.

APPROVED ADVISORY STATEMENTS

Academic Integrity

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. **It is your responsibility to understand what constitutes academic dishonesty.**

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the [Academic Integrity Policy](https://secretariat.mcmaster.ca/university-policies-proceduresguidelines/), located at <https://secretariat.mcmaster.ca/university-policies-proceduresguidelines/>

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

Courses with an On-line Element

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn, LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

Online Proctoring

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

Conduct Expectations

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the [Code of Student Rights & Responsibilities](#) (the “Code”). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online.**

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students’ access to these platforms.

Equity, Diversity, and Inclusion

The Faculty of Engineering is committed to creating an environment in which students of all genders, cultures, ethnicities, races, sexual orientations, abilities, and socioeconomic backgrounds have equal access to education and are welcomed and treated fairly. If you have any concerns regarding inclusion in our Faculty, in particular if you or one of your peers is experiencing harassment or discrimination, you are encouraged to contact the Chair, Associate Undergraduate Chair, Academic Advisor or to contact the [Equity and Inclusion Office](#).

Academic Accommodation of Students with Disabilities

Students with disabilities who require academic accommodation must contact [Student Accessibility Services](#) (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's [Academic Accommodation of Students with Disabilities](#) policy.

Academic Advising

For any academic inquires please reach out to the Office of the Associate Dean (Academic) in Engineering located in JHE-Hatch 301.

Details on academic supports and contact information are available from:

<https://www.eng.mcmaster.ca/programs/academic-advising>

Requests for Relief for Missed Academic Term Work

In the event of an absence for medical or other reasons, students should review and follow the [Policy on Requests for Relief for Missed Academic Term Work](#).

Academic Accommodation for Religious, Indigenous, or Spiritual Observances (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the [RISO](#) policy. Students should submit their request to their Faculty Office *normally within 10 working days* of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Copyright and Recording

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

Extreme Circumstances

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, Avenue to Learn and/or McMaster email.

Turnitin.com

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.