

W.Booth School of Engineering Practice
&Technology
PROCTECH 4SS3
System Specification and Design
Fall 2023



ENGINEERING

Instructor Information

Konstantinos Apostolou
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Office: ETB/213
Office Hours:
TBD

Course Information

Lectures: 3 hours per week

Tutorials: 1 hour per week, in computer lab

Course Dates: 09/05/2023 - 12/06/2023

Units: 3.00

Course Delivery Mode: In Person

Course Description: This course focuses on requirement analysis, functional design, detailed design, reliability, maintainability and system life cycle. Methodologies and tools, requirements and validations, requirements for safety-related systems and mission critical systems. Two lectures, one tutorial (two hours); first term Prerequisite(s): PROCTECH 2SE3, PROCTECH 2CA3, and registration in level IV of Automation Systems Engineering Technology.

Instructor-Specific Course Information

Course Description:

This project-based course provides the knowledge required to design automation systems using the Unified Modeling Language. The theory is complemented by case studies analyzed in detail. The focus of the project for this course is using UML in systems design. The project enables students to design automation systems using a formal method (UML).

Course Policies:

- Attendance at the course's tutorials is mandatory
- Software design assignment(s) can be completed with any software with UML capabilities, but Enterprise Architect is recommended.
- Late assignments and reports will result in 10% reduction in the assigned marks for each day the report is late, including weekends and holidays.

Meeting Details

Week	Topic
Week 1	<u>Introduction to System Specification and Design</u> Design process and design methods, automation systems design using UML: history of UML, object-oriented concepts, models, diagrams and views, degrees of UML and tools for objective analysis
Week 2	<u>Design problem and design objectives</u> Definition of the design problem, design objectives
Week 3	<u>System Requirements using use case modeling</u> Use case, use case symbols, use case relationships, use case diagrams
Week 4	<u>Design Alternatives</u> Generation and evaluation of design alternatives, morphological chart, design space, applying metrics to objectives, concept screening
Week 5	<u>Design modelling, analysis and optimization</u> Basic principles of modelling, abstract, prototyping
Mid-term Recess	
Week 6	<u>System Requirements Analysis</u> Main scenarios, alternative and exception scenarios, UML tools
Week 7	<u>System Requirements Analysis</u>

	Activity diagrams, Symbols, and creating activity diagrams, UML tool
Week 8	<u>Project Costing.</u> Bills of quantities, software cost estimation-cost modelling methods, COCOMO, use case cost estimation, technical and environmental factors
Week 9	<u>System Specification</u> System static modeling, classes, types of classes, class attributes and behaviors, class diagram, relationships. UML tool for software cost estimation
Week 10	<u>System Specification</u> System dynamic models: modelling interaction between objects-sequence diagram, symbols, UML tool for drawing sequence diagram
Week 11	<u>System Specification:</u> System dynamic models: model dynamic behavior of single objects-state chart diagram, start transition, symbols, triggers
Week 12	<u>Project Presentations</u>
Week 13	<u>Project Presentations</u>

Important Links

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

Course Learning Outcomes

For accreditation reasons, these learning outcome statements must be tied back to CEAB graduate attributes (GAs), including those that are measured in this course. If you are unsure how to do this, please contact the Associate Chair Undergraduate in your department.

- Use UML for system specification and design problems.
- Conduct requirement analysis studies using use case modeling.
- Model static behaviours of automation systems using UML.
- Model dynamic behaviours of automation systems using UML.
- Analyse alternation solutions to design problems.
- Determine effects of software requirements on project resources.

Required Materials and Texts

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

N/A

Optional Course Materials

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

Designing Concurrent, Distributed, and Real-Time Applications with UML

ISBN: 978-0321951816

Authors: Hassan Gomaa

Publisher: Addison-Wesley Professional

Publication Date: August 2000

Edition: 1st

UML @ Classroom: An introduction to Object-Oriented Modeling

ISBN: 978-3319127415

Authors: Martina Seidl, Marion Scholz, Christian Huemer, Gerti Kappel

Publisher: Springer

Publication Date: March 2015

Available through

<https://link.springer.com/book/10.1007/978-3-319-12742-2>

(possibly through McMaster?)

Class Format

In Person

Course Evaluation

Assessment	Weight
Quizzes	10%
Mid-term Test	15%
Design Project	50%
Final Examination (tests cumulative knowledge)	25%

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

Grade	Equivalent Grade Point	Equivalent Percentages
F	0	0-49

Course Schedule

Lectures:

Wednesday 8:30AM - 10:20AM in T13 127

Friday 11:30AM - 12:20PM in T13 127

Tutorials:

T01: Wednesday 1:30PM - 2:20PM in ETB 234

T02: Wednesday 2:30PM - 3:20PM in ETB 234

T03: Wednesday 3:30PM - 4:20PM in ETB 234

Laboratory Overview, Operation, and Safety

The Faculty of Engineering is committed to McMaster University's Workplace and Environmental Health and Safety Policy which states: "Students are required by University policy to comply with all University health, safety and environmental programs and policies". It is your responsibility to understand McMaster University's Risk Management system, which is supported by a collection of Risk Management Manuals (RMMs) that contain programs and policies in support of the Risk Management System. The RMMs are available from https://hr.mcmaster.ca/employees/health_safety_well-being/our-safety/risk-management-manuals-rmms/.

It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for specific experiments (see course lab manuals) and the laboratory equipment [**instructor to link to department specific lab safety manuals**].

The safety requirements for [Room # where lab takes place] are listed below: [**instructor to insert – it may be useful to have a menu of rooms with SOPs pre-written for instructors to choose from – this keeps info consistent and accurate**].

Additionally, McMaster University's workplace health and safety guidance related to COVID-19 must always be followed (available from <https://hr.mcmaster.ca/resources/covid19/workplace-health-and-safety-guidance-during-covid-19/>).

Late Assignments

Late assignments and reports will result in 10% reduction in the assigned marks for each day the report is late, including weekends and holidays

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:

Quizzes will be either on-line asynchronous or 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 quiz will be accommodated by extending the submission window for that quiz. A submitted MSAF for an in-class synchronous quiz will be accommodated either by distributing the weight of the quiz to the remaining quiz components (which might mean that a student will miss any opportunity to "drop" the worst quiz from his/her grade) or by providing the opportunity to take an equivalent on-line asynchronous quiz.

Tutorial Sessions:

Tutorials must complete in the section/time students are registered at. Absence from a tutorial without an approved MSAF form will result in a grade of zero for the corresponding assignment. Assignments submitted late without an acceptable explanation or prior permission will be penalized by 10% per calendar day.

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.

Generative AI: Use Prohibited

Students are not permitted to use generative AI in this course. In alignment with [McMaster academic integrity policy](#), it “shall be an offence knowingly to ... submit academic work for assessment that was purchased or acquired from another source”. This includes work created by generative AI tools. Also state in the policy is the following, “Contract Cheating is the act of “outsourcing of student work to third parties” (Lancaster & Clarke, 2016, p. 639) with or without payment.” Using Generative AI tools is a form of contract cheating. Charges of academic dishonesty will be brought forward to the Office of Academic Integrity.

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.

Authenticity / Plagiarism

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. Avenue to Learn, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

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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.

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.