Course Outline

1. COURSE INFORMATION

Session Offered	Fall 2021
Course Name	System Specification and Design
Course Code	PROCTECH 4SS3
Date(s) and Time(s) of lectures	C01: Wednesday 10:30am - 12:20pm, Friday 11:30am - 12:20pm T01: Wednesday 1:30pm - 2:20pm T02: Wednesday 2:30pm - 3:20pm T03: Wednesday 3:30pm - 4:20pm
Program Name	Automation Engineering Technology
Calendar 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.
Instructor(s)	Marcin Magolon	E-Mail: magoloms@mcmaster.ca Office Hours & Location: On Demand, Online (Microsoft Teams)

2. COURSE SPECIFICS

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 the design automation systems using a formal method UML in systems design.		

	Code	**Type**	**Hours per term**
Instruction Type	C	Classroom instruction	26
	L	Laboratory, workshop or fieldwork	
	T	Tutorial	13
	DE	Distance education	
		Total Hours	39

	ISBN	**Textbook Title & Edition**	**Author & Publisher**
Resources	**ISBN: 0-201-65793-7**	Designing Concurrent, Distributed and Real-Time Applications with UML *(OPTIONAL)*	*Hassan Gomaa, Publisher: Addison-Wesley*
	Other Supplies	**Source**	
	Class Notes	Avenue to Learn	
	Enterprise Architect, UML Application	Available on the lab computers in ETB 234 and as an extendable trial version from Sparx Systems	

Prerequisite(s)	*PROCTECH 2CA3, registration in Level IIIB of Process Automation Technology*
Corequisite(s)	
Antirequisite(s)	

Course Specific Policies	Software design assignment(s) will be completed with any software with UML capabilities (e.g. Enterprise Architect). *Late assignments and reports will result in 10% reduction in the assigned marks for each day the report is late, including weekends and holidays.*
Departmental Policies	Students must maintain a GPA of 3.5/12 to continue in the program. In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of "out-of-class" work for every scheduled hour in class. "Out-of-class" work includes reading, research, assignments and preparation for tests and examinations. Where group work is indicated in the course outline, such collaborative work is mandatory. The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception. Announcements made in class or placed on Avenue are considered to have been communicated to all students including those individuals that are not in class. Instructor has the right to submit work to software to identify plagiarism.

3. SUB TOPIC(S)

Week 1	**Introduction to System Specification and Design** 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	**Design Problem and Design Objectives:** Definition of the design problem, design objective
Week 3	**System Requirements Using Use Case Modeling:** Use case, use case symbols, use case relationships, use case diagrams
Week 4	**Design Alternatives:** Generation and evaluation of design alternatives, morphological chart, design space, applying metrics to objectives, concept screening
Week 5	**Design Modelling, Analysis, and Optimization:** Basic principles of mathematic modelling, abstract, prototyping
Week 6	**System Requirements Analysis:** Main scenarios, alternative and exception scenarios, UML tool
Week 7	**System Requirements Analysis:** Activity diagrams, Symbols, and creating activity diagrams, UML tool
Week 8	**Project Costing:** Bills of quantities, software cost estimation-cost modelling methods, COCOMO, use case cost estimation, technical and environmental factors
Week 9	**System Specification:** System static modeling, classes, types of classes, class attributes and behaviors, class diagram, relationships. UML tool for software cost estimation
Week 10	**System Specification:**

	System dynamic models: modelling interaction between objects-sequence diagram, symbols, UML tool for drawing sequence diagram
Week 11	**System Specification:** System dynamic models: model dynamic behavior of single objects-state chart diagram, start transition, symbols, triggers
Week 12	**Using UML in a Systems Approach to Designing Automation Systems:** System wide approach to design, designing smart systems that support Industry 4.0
Week 13	**Project Presentations**
Midterm Recess: Monday, October 11 to Sunday, October 17 Classes end: Wednesday, December 8th, 2021 Final Examination Period: Thursday, December 9 to Wednesday, December 22 All examinations MUST be written during the scheduled examination period.	

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.

4. ASSESSMENT OF LEARNING *including dates*	Weight
Quizzes	10%
Mid-term Test	15%
Design Project	50%
Final examination (tests cumulative knowledge)	25%
TOTAL	**100%**

Percentage grades will be converted to letter grades and grade points per the University calendar.

5.   LEARNING OUTCOMES

1.   Use UML for system specification and design problems
2.   Conduct requirement analysis studies using use case modeling.
3.   Model static behaviours of automation systems using UML.
4.   Model dynamic behaviours of automation systems using UML.
5.   Analyse alternation solutions to design problems.
6.   Determine effects of software requirements on project resource.

6.   COURSE OUTLINE – APPROVED ADVISORY STATEMENTS

ANTI-DISCRIMINATION

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.

http://www.mcmaster.ca/policy/General/HR/Discrimination_Harassment_Sexual_Harassment-Prevention&Response.pdf

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, located at https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/

The following illustrates only three forms of academic dishonesty: 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 DETECTION

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.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), 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.

COMMUNICATIONS

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

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.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "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. http://www.mcmaster.ca/policy/Students-AcademicStudies/Studentcode.pdf

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, A2L and/or McMaster email.