ALGONQUIN COLLEGE

CST2234
Systems Analysis and Design
Course Outline

2022-2023

Pre-requisite(s)	CST8215 and CST8284 and ENL2019T
Co-requisite(s)	N/A
Prepared by	Melissa Sienkiewicz
Approved by	Sandra Brancatelli, M.Eng., P.Eng., Academic Chair, ICT - Applications & Programming
Normative hours	56.00
Grading system	A+ Through F
Experiential Learning	No

Applicable Program(s)	Level	Core/Elective
0336X01FWO - Computer Programming	3	Core
0336X03FWO - Computer Programming	3	Core
0336X07PAO - Computer Programming	3	Core
0336X09FAO - Computer Programming	3	Core
1561X01FWO - Computer Programming and Analysis	3	Core
1561X03FWO - Computer Programming and Analysis	3	Core

Course Description

Complex information technology systems require extensive planning and design. Guided by industry standard software engineering methodologies, students gain hands-on experience with case studies used to develop systems from inception through elaboration, construction and transition phases. Object-oriented design, modeling tools and techniques are used to produce system specifications. Project management principles are also used within team developed projects. Software methodologies discussed include the Systems Development Life Cycle (SDLC), agile approach, Rational Unified Process (RUP) and Rapid Application Development (RAD).

Vocational Learning Outcomes

This course provides the opportunity for you to achieve the following outcomes:

0336X01FWO - Computer Programming

VLO 1 Identify, analyze, develop, implement, verify and document the requirements for a computing environment. (T, A)

VLO 3 Implement and maintain secure computing environments. (T, A)

VLO 4 Implement robust computing system solutions through validation testing that aligns with industry best practices. (T, A)

VLO 5 Communicate and collaborate with team members and stakeholders to ensure effective working relationships. (T, A)

VLO 6 Select and apply strategies for personal and professional development to enhance work performance (T, A)

VLO 7 Apply project management principles and tools when working on projects within a computing environment (T, A)

VLO 8 Adhere to ethical, legal, and regulatory requirements and/or principles in the development and management of computing solutions and systems. (T, A)

0336X03FWO - Computer Programming

VLO 1 Identify, analyze, develop, implement, verify and document the requirements for a computing environment. (T, A)

VLO 3 Implement and maintain secure computing environments. (T, A)

VLO 4 Implement robust computing system solutions through validation testing that aligns with industry best practices. (T, A)

VLO 5 Communicate and collaborate with team members and stakeholders to ensure effective working relationships. (T, A)

VLO 6 Select and apply strategies for personal and professional development to enhance work performance (T, A)

VLO 7 Apply project management principles and tools when working on projects within a computing environment (T, A)

VLO 8 Adhere to ethical, legal, and regulatory requirements and/or principles in the development and management of computing solutions and systems. (T, A)

0336X07PAO - Computer Programming

VLO 1 Identify, analyze, develop, implement, verify and document the requirements for a computing environment. (T, A)

VLO 3 Implement and maintain secure computing environments. (T, A)

VLO 4 Implement robust computing system solutions through validation testing that aligns with industry best practices. (T, A)

VLO 5   Communicate and collaborate with team members and stakeholders to ensure effective working relationships. (T, A)

VLO 6   Select and apply strategies for personal and professional development to enhance work performance (T, A)

VLO 7   Apply project management principles and tools when working on projects within a computing environment (T, A)

VLO 8   Adhere to ethical, legal, and regulatory requirements and/or principles in the development and management of computing solutions and systems. (T, A)

0336X09FAO - Computer Programming

VLO 1   Identify, analyze, develop, implement, verify and document the requirements for a computing environment. (T, A)

VLO 3   Implement and maintain secure computing environments. (T, A)

VLO 4   Implement robust computing system solutions through validation testing that aligns with industry best practices. (T, A)

VLO 5   Communicate and collaborate with team members and stakeholders to ensure effective working relationships. (T, A)

VLO 6   Select and apply strategies for personal and professional development to enhance work performance (T, A)

VLO 7   Apply project management principles and tools when working on projects within a computing environment (T, A)

VLO 8   Adhere to ethical, legal, and regulatory requirements and/or principles in the development and management of computing solutions and systems. (T, A)

1561X01FWO - Computer Programming and Analysis

1561X03FWO - Computer Programming and Analysis

Assessment Levels —T: Taught **A**: Assessed **CP**: Culminating Performance

Essential Employability Skills

This course contributes to your program by helping you achieve the following Essential Employability Skills:

EES 1   Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. (T, A)

EES 5   Use a variety of thinking skills to anticipate and solve problems. (T, A)

EES 6   Locate, select, organize and document information using appropriate technology and information systems. (T, A)

EES 7   Analyze, evaluate and apply relevant information from a variety of sources. (T, A)

EES 8   Show respect for diverse opinions, values, belief systems and contributions of others. (T, A, CP)

EES 9   Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. (T, A)

EES 10   Manage the use of time and other resources to complete projects. (T, A)

EES 11   Take responsibility for one's own actions, decisions and consequences. (A)

Assessment Levels —T: Taught **A**: Assessed **CP**: Culminating Performance

Course Learning Requirements / Embedded Knowledge and Skills

When you have earned credit for this course, you will have demonstrated the ability to:

1. Plan the tasks involved in the scheduling of a project team working on a system analysis and design project using project management techniques.

- Describe System Development Life Cycle (SDLC) terminology.
- Explain the different approaches in an Software Development Life Cycle (SDLC) (e.g. Agile, Lean, Waterfall).
- Identify the appropriate System Development Life Cycle (SDLC) methodology and approach for the project.
- Identify the sequence of phases, tasks and activities involved in the chosen SDLC.
- Describe the tasks involved in a given project and organize these tasks in a logical order.
- Generate and document tasks and assignments using software tools.
- Develop a draft project plan encompasing the main performance domains from the PMBOK.
- Use prescribed methods for the acquisition of information required to define the context and scope of the system to be developed.
- Refine project plans to include details necessary to accomplish assigned tasks.

2. Document the system requirements for a systems application using current methodologies and documentation guidelines.

- Document system behavior, both high-level and low-level, using Use Case Narratives and Diagrams.
- Develop the prescribed object-oriented artifacts of the elaboration phase of a case-study project.
- Investigate alternate system and application software, languages and hardware which may become part of the design solution or proposal.
- Prepare and present relative project documents as specified by a case project.
- Document the licensing needed for software components and / or development tools for the development of a systems application.
- Develop and present artifacts from the inception, elaboration, construction, and transition phases.

3. Create Unified Modeling Language (UML) artifacts which model the static and dynamic aspects of a system as required by systems developers and programmers.

- Use UML artifacts such as static class diagrams, interaction diagrams, activity diagrams, state diagrams, package diagrams and deployment diagrams.
- Develop diagrams and documentation representing each perspective, conceptual, specification, and implementation.
- Use UML class diagrams, activity diagrams, system sequence diagrams to model system behavior.
- Document system behavior, both high-level and low-level, using Use Case Narratives and Diagrams.

4. Include aspects of scalability and maintainability in the design of the system under study.

- Identify the criteria involved in the maintainability of systems and applications.
- Use selected Gang of Four (GoF) design patterns (as appropriate for a case study).
- Use system application layering (presentation, domain, data management layers).
- Use multiple tiers for a system as required by specifications (multiple servers), specifically use the data access object design pattern.

5. Develop high level test plans for a system.

- Describe the different types and approaches to testing.
- Develop high level test plans which specifying types of tests, when and where they must occur.
- Draft basic test plan / scenario and test cases for a software case-study system.

6. Use Object-Oriented Design (OOD) tools and project management tools to develop system artifacts and manage the project.

- Present and manage the activities involved in a case study using project management software.
- Develop OOD artifacts, using current object oriented design tools, for a case-study development project.

7. Use design principles to develop economically sustainable software solutions.

- Design applications such that they meet criteria for maintainability, sustainability, and enhancement.
- Design applications such that they meet the criteria ensuring the security of the processes and the data thus meeting social aspects for security and control.
- Discuss the importance of adhering to licensing agreements of software, software components, and development tools in the development of a systems application.

Learning Resources

Textbook:

- None.

Other References:

- Lecture notes and other course resources are provided on the LMS (Learning Management System) and reviewed in class.

Required Software:

- Office 365

Learning Activities

Teaching/Learning Methods

The course consists of:
- Lectures (2 hours per week)
- Hybrid Activities (1 hour per week)
- Labs (1 hour per week)

It is also anticipated that you will need to spend an additional 4 hours per week, on average, of your own time for study and portfolio assignment completion.
During this course you are likely to experience:

Lectures, Labs, Walkthroughs and Portfolio Exercises:

Lectures will present the theoretical material of the course. Students are expected to attend all of the lectures.   Students are encouraged to ask questions during lectures and to consult with the professors on topics which they do not understand. Professors will inform students at the beginning of the course of suitable times for consultations. Two selected portfolio exercises will be submitted during

Pre-defined Evaluation / Earning Credit

The following list provides evidence of this course's learning achievements and the outcomes they validate:

Lab Activity(ies) (5%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 6, EES 5, EES 6, EES 9, EES 11

Portfolio(s) (35%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, CLR 7, EES 1, EES 5, EES 6, EES 7, EES 8, EES 9, EES 10, EES 11

Hybrid Assignment(s) (10%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, CLR 7, EES 1, EES 6, EES 7, EES 9, EES 11

Midterm Exam(s) (20%)

Validates Outcomes: CLR 1, CLR 2, CLR 7, EES 1, EES 5, EES 7

Final Exam (30%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, CLR 7, EES 1, EES 6, EES 7, EES 8

Prior Learning Assessment and Recognition

Students who wish to apply for Prior Learning Assessment and Recognition (PLAR) need to demonstrate competency at a post-secondary level in all outlined course learning requirements. Evidence of learning achievement for PLAR candidates includes:

- Portfolio
- Challenge Exam

- Performance Test
- Project/Assignment

Other Information

Students are required to respect the confidentiality of employer, client and/or patient information, interactions, and practices that occur either on Algonquin College premises, or at an affiliated clinical/field/co-op placement site. Concerns regarding clients, patients, and/or employer practices are to be brought to the attention of the program coordinator, or designated field/clinical/co-op placement supervisor so that they may be resolved collaboratively. Such concerns are not to be raised publically either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways.

Grade Scheme

Final Grade	Mark Equivalent	Numeric Value	Final Grade	Mark Equivalent	Numeric Value
A+	90% - 100%	4.0	A	85% - 89%	3.8
A-	80% - 84%	3.6	B+	77% - 79%	3.3
B	73% - 76%	3.0	B-	70% - 72%	2.7
C+	67% - 69%	2.3	C	63% - 66%	2.0
C-	60% - 62%	1.7	D+	57% - 59%	1.4
D	53% - 56%	1.2	D-	50% - 52%	1.0
F	0% - 49%	0	FSP	0	0

Course Related Information

Please refer to the Course Section Information (CSI) / weekly schedule for specific course-related information as provided by your professor.

Department Information

STUDENT ACADEMIC RESPONSIBILITIES

Each student is responsible for:
• Knowing the due dates for marked out-of-class assignments.
• Attending all classes and knowing the dates of in-class marked assignments and exercises.
• Maintaining a folder of all work done in the course during the semester for validation claims in cases of disagreement with faculty.
• Keeping both paper and electronic copies of all assignments, marked and unmarked, in case papers are lost or go missing.
• Regularly checking both Brightspace announcements as well as one's Algonquin e-mail account for important messages from both professors and college administration.
• Participating in on-line and classroom exercises and activities as required.
• Retaining course outlines for possible future use to support applications for transfer of credit to other educational institutions.

Department Grading Policy - For all courses that have both a theory and practical (lab) component, students must have a grade of at least 50% (or "D-") on both the theory component as well as in the practical (i.e. lab) component in order to achieve a passing grade in the course. i.e. Even if your combined grade exceeds 50% for the entire course, if you fail either the theory component or the practical component, you will not achieve a passing grade in the course.

Lab/Practical Assessment Demonstration "Demo" Requirements - Certain courses require students to demo their work after it has been submitted. These will be scheduled by the professor and involve 1-2 rudimentary questions to assure the professor that the work submitted by the student is their own. Demos are <u>not</u> graded items - the work submitted is graded. However, where demos are required, if a student does not demo their work, the work will not be graded (i.e. grade of 0 on the lab or practical assessment).

Department Academic Dishonesty Policy - Academic Integrity is very important to all of our faculty and administrative staff and as such, measures have been put into place to detect all forms of academic dishonesty, including plagiarism of code. If plagiarism is detected by a professor, the incident will be reported and investigated. If the findings of the investigation are that a student has submitted plagiarized work as their own, they will be subject to the following policy:
1. The first offence will result in the plagiarized assessment being assigned a grade of 0.
2. The second offence will result in the assignment of a grade of F for the course.
3. The third offence will result in removal of a student from the program of study.

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether involving a professor and a student or amongst students, will not be tolerated on the college premises. Action taken will start with a formal warning and proceed to the full disciplinary actions as outlined in Algonquin College Policies - HR22 and SA07.
Harassment means one or a series of vexatious comment(s) (whether done verbally or through electronic means), or conduct related to one or more of the prohibited grounds that is known or ought reasonably to be known to be unwelcome/unwanted, offensive, intimidating, derogatory or hostile. This may include, but is not limited to: gestures, remarks, jokes, taunting, innuendo, display of offensive materials, offensive graffiti, threats, verbal or physical assault, stalking, slurs, shunning or exclusion related to the prohibited grounds.

For further information, a copy of the official policy statement can be obtained from the Student Association.

Violation of the Copyright Act
General – The Copyright Act makes it an offence to reproduce or distribute, in whatever format, any part of a publication without the prior written permission of the publisher. For complete details, see the Government of Canada website at http://laws.justice.gc.ca/en/C-42 . Make sure you give it due consideration, before deciding not to purchase a textbook or material required for your course.

Software Piracy - The Copyright Act has been updated to include software products. Be sure to carefully read the licensing agreement of any product you purchase or download, and understand the terms and conditions covering its use, installation and distribution (where applicable). Any infringement of licensing agreement makes you liable under the law.

Disruptive Behaviour is any conduct, or threatened conduct, that is disruptive to the learning process or that interferes with the well being of other members of the College community. It will not be tolerated. Members of the College community, both students and staff, have the right to learn and work in a secure and productive environment. The College will make every effort to protect that right. Incidents of disruptive behaviour must be reported in writing to the departmental Chair as quickly as possible. The Chair will hold a hearing to review available information and determine any sanctions that will be imposed. Disciplinary hearings can result in penalties ranging from a written warning to expulsion.

For further details, consult the Algonquin College Policies AA32, SA07 and IT01 in your Instaguide.

College Related Information

Algonquin College's policies have been developed to ensure the health, safety and security of all students, faculty and staff, and the proper and fair operation of the College as an academic institution and employer. Please refer to the Algonquin College Policies website for the most current policy information available at http://www.algonquincollege.com/policies/.

Students are especially encouraged to be aware of the following College expectations

Academic Integrity

Algonquin College is committed to the highest standards of academic integrity, and students are expected to uphold these standards as part of the learning process. Any academic work submitted by a student is expected to be their own work, unless designated otherwise and all sources must be attributed. All students should be familiar with the Algonquin College policy AA48: Academic Integrity which outlines student's roles and responsibilities and what represents academic dishonesty. In some courses, online proctoring may be used to prevent academic dishonesty. Additional information can be found at Academic Integrity - Student Survival Guide - Subject Guides at Algonquin College (libguides.com) and via Academic Integrity Student Resources. Students with any questions about the course expectations regarding academic integrity are encouraged to speak to their professor and the College's academic integrity team at acaio@algonquincollege.com

Centre for Accessible Learning

Students with visible and/or non-visible disabilities are encouraged to register with the Centre for Accessible Learning (CAL) in order to be eligible for appropriate learning supports and/or accommodations. Students are strongly encouraged to make an appointment with the Centre for Accessible Learning as early as possible when starting a program. Once your needs are identified, a Letter of Accommodation (LOA) will be issued which you can share with your professors. If you are a returning student, please ensure that professors are given a copy of your LOA each semester.

College Email

Students at Algonquin College are provided with a college email account. This is the address that will be used when the College, your professors, or your fellow students communicate important information about your program or course activities. Your network credentials can be found in the ACSIS portal and you are expected to check your Algonquin email regularly and to use it to send and receive college-related email. Support is available through the college Information Technology Service (ITS) at: https://www.algonquincollege.com/its/

Retroactive Accommodations

Students are expected to meet evaluation and completion deadlines as stated in course outline and course section information documents. In circumstances where evaluation and/or completion deadlines are missed or student performance has been affected by a temporary or permanent disability (including mental health), interim or retroactive accommodations may be considered. In such instances, please consult your course faculty member. For other situations where deferral of evaluations may be warranted, please?consult Algonquin College?Policy?AA21: Deferred Evaluation.

Student Course Feedback

Algonquin College's invites students to share their course experience by completing a student course feedback survey for each course they take. For further details consult Algonquin College Policy AA25: Student Course Feedback.

Use of Mobile Devices in Class

With the proliferation of small, personal mobile devices used for communications and data storage, Algonquin College believes there is a need to address their use during classes and examinations. During classes, the use of such devices unless authorized by your professor can be disruptive and disrespectful to others. During examinations, the use of such devices is generally prohibited unless authorized by your professor. Otherwise use is considered academic dishonesty in the form of cheating. For further details consult Algonquin CollegePolicy AA32: Use of Mobile Devices in Class

Technology Requirements

Students are required to have access to a computer and to the internet. There may also be additional technology-related resources required to participate in a course that are not included in the course materials fee, such as headphones, webcams, specialized software, etc. Details on these requirements can be found in the Course Section Information of the course outline for each course available on Brightspace.

Transfer of Credit

It is the student's responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

Safe Harbour

In the event of an unexpected major event (pandemic, etc.), your course may have changes that are not reflected in the Course Outline. Should this happen, the Course Section Information document will have updated information about your course.