

Technology as a Useful Tool

Mechanical and Transportation Technology

Course Number: DAT9102	Contribution to Program: General Education	Normative Hours: 45
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 1	Core/Elective: Core
Prepared by: Joel Smith Professor		Approval Date: 24/06/2012
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical & Transportation Technology
Pre-Requisites N/A		Approved for Academic Year: 2012-2013

COURSE DESCRIPTION

Topics, such as standard computer software (word processors and spreadsheets), Internet and email basics and LAN Technology are covered. Issues, such as ethics (personal and business), problem-solving skills, time management are discussed and the benefits that computers can add to our daily lives are explored.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This is a general education course that supports learning in the following theme area: Science and Technology

T: Teach **A:** Assess **CP:** Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|----|---|
| 1 | Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience.(A) |
| 4 | Apply a systematic approach to solve problems.(A) |
| 5 | Use a variety of thinking skills to anticipate and solve problems.(T,A) |
| 6 | Locate, select, organize and document information using appropriate technology and information systems.(T,A) |
| 9 | Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. (A) |
| 10 | Manage the use of time and other resources to complete projects.(T,A) |
| 11 | Take responsibility for one's own actions, decisions and consequences.(T,A) |

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Discuss issues related to the day-to-day use of computers in various settings.	<ul style="list-style-type: none"> 1 Be aware of the issues of personal or corporate privacy and security concerns associated with current technology. 1 Assess the possible loss of value (your work) due to computer viruses. 1 Explain the theoretical basis for a computer problem. 1 Learn to use "help" features (on-line or off-line). 1 Outline the theoretical, ethical, and historical evolution of a digital environment.
2. Discuss the issues involved in the ethical use of a computer in	<ul style="list-style-type: none"> 1 License agreements.

modern technology.	<ul style="list-style-type: none"> 1 Software piracy. 1 Spam. 1 On-line harassment. 1 State the rules and regulations that apply to online environments such as the World Wide Web. 1 Use the vocabulary of the Information Technology (IT) field correctly and effectively. 1 Criticise a user agreement or End User License Agreement (EULA) and GNU General Public Licenses.
3. Evaluate the use of information technology in today's workplace.	<ul style="list-style-type: none"> 1 Appreciate the role of computers in today's workplace. 1 Communicate graphically by producing documents using software applications, and interpreting given graphical documents. 1 Send, receive and organize e-mail messages. 1 Modify and enhance documents by electronic means. 1 Describe key computing concepts in non-technical terms. 1 Explain the effects of technological change on daily life. 1 Evaluate the use of computers for educational purposes.
4. Evaluate the proper use of tools available in today's world of technology.	<ul style="list-style-type: none"> 1 Evaluate the use of information technology in the workplace. 1 Use on-line resources to research technical questions. 1 Use an operating system to manage files and execute software applications. 1 Relate different forms of communication to the real world. 1 Prepare a list of important questions to ask when entering a new digital environment.
5. Work out an approach to solve a technology-related problem.	<ul style="list-style-type: none"> 1 Gather information quickly and honestly from the Internet. 1 Assess the validity of information taken from websites. 1 Assess and share information in an ethical manner. 1 Use available instruments to verify information to be used in computer reports. 1 Choose the fastest tool to complete a task. 1 Develop reasonable estimates of the time required to complete tasks that involve computers.
6. Make use of the computer (and associated resources) as a tool for solving problems and managing time.	<ul style="list-style-type: none"> 1 Function competently and quickly in various on-line environments. 1 Establish a "time budget" to complete assignments working with a computer. 1 Meet deadlines. 1 Evaluate your estimates of time required to perform tasks using on-line resources. 1 Identify trends that have emerged in society's use of computers. 1 Envision the ways in which current trends may continue to evolve in the future.

LEARNING RESOURCES

Learning resources will primarily be course notes posted to BlackBoard. The student is responsible for following the weekly schedule and CSI to ensure that they are accessing the required material. There may also be recommended Websites for additional information.

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:
Practice assignments based on course note information.

Posting of assignments and class materials to BlackBoard and Internet sites.
Exercises requiring the use of a computer.
Individual assignments.
Investigative research on-line.
Personal reflection exercises.
Participate in on-line group discussion boards.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
2 Quizzes (On-Line) Quiz 1-----5% Quiz 2-----5% TOTAL-----10%	1 Evaluate the use of information technology in today's workplace. - [CLR 3] 1 Work out an approach to solve a technology-related problem. - [CLR 5] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
7 Assignments Assignment 1-----10% Assignment 2-----10% Assignment 3-----10% Assignment 4-----10% Assignment 5-----10% Assignment 6-----10% Assignment 7-----10% TOTAL-----70%	1 Discuss the issues involved in the ethical use of a computer in modern technology. - [CLR 2] 1 Discuss issues related to the day-to-day use of computers in various settings. - [CLR 1] 1 Evaluate the use of information technology in today's workplace. - [CLR 3] 1 Work out an approach to solve a technology-related problem. - [CLR 5] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. - [EES 9] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
Final Exam Final Project-----15% Final Test (On-Line)-----5% TOTAL -----20%	1 Discuss issues related to the day-to-day use of computers in various settings. - [CLR 1] 1 Evaluate the proper use of tools available in today's world of technology. - [CLR 4] 1 Make use of the computer (and associated resources) as a tool for solving problems and managing time. - [CLR 6] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Manage the use of time and other resources to complete projects. - [EES 10]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

Final Grade	Mark Equivalent	Numeric Value	Final Grade	Mark Equivalent	Numeric Value
A+	90-100%	4.0	C+	67-69%	2.3
A	85-89%	3.8	C	63-66%	2.0
A-	80-84%	3.6	C-	60-62%	1.7

B+	77-79%	3.3	D+	57-59%	1.4
B	73-76%	3.0	D	53-56%	1.2
B-	70-72%	2.7	D-	50-52%	1.0
			F	0-49%	0
			FSP	0	0

OTHER COURSE 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.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Challenge Exam

RELATED INFORMATION

The following information is course-specific:

Workload Requirements

- This course is an online course, which means that all work is done on-line from your residence or College Access Center.
- On average, students should allocate three hours of work per week. This time commitment will vary, based upon the students' technical aptitude and prior learning skills.
- Students **can not** earn credit for this course unless 70% of assignments and quizzes have been completed.

Respect for Confidentiality

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.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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

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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Basic Electronic Assembly

Mechanical and Transportation Technology

Course Number: ELN8613	Contribution to Program: Vocational	Normative Hours: 30
Applicable Program(s): 0550X01FWO EME Technician - Robotics 1438T01FWO GAS - One Year - Pre-Technology	AAL: 1 2	Core/Elective: Core Core
Prepared by: Luc Gyre Professor	Approval Date: 04/09/2012	
Co-Requisites N/A	Approved by: Misheck Mwaba, PhD., P.Eng Chair, Mechanical and Transportation Technology	
Pre-Requisites N/A	Approved for Academic Year: 2012-2013	

COURSE DESCRIPTION

Students are exposed to soldering techniques. Brief lecture sessions provide the theoretical background followed by practical skills demonstration by the instructor. Students do practical labs based on the theory/demo to develop various skills, such as Printed Circuit Board component soldering (and de-soldering) for both traditional Through-Hole and Surface Mount Technology. They build their own set of meter leads and a functional project, (such as a Logic Probe) which they retain for use in other electronic courses.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:	
EME Technician - Robotics 0550X01FWO	
1	Fabricate mechanical components and assemblies, and assemble electrical components and electronic assemblies by applying workshop skills and knowledge of basic shop practices in accordance with applicable codes and safety practices.(T,A)
14	Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(T,A)
GAS - One Year - Pre-Technology 1438T01FWO	
1	Develop, through general knowledge gained in a wide range of subjects, insight into both self and society.(T,A)

T: Teach A: Assess CP: Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

The course contributes to your program by helping you achieve the following Essential Employability Skills:	
6	Locate, select, organize and document information using appropriate technology and information systems.(A)
10	Manage the use of time and other resources to complete projects.(T,A)

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. demonstrate acceptable safety practices at all times in a lab environment	1 Students acquire knowledge of safety practices for the individual, for their co-worker, and the proper care and use of hand tools
2. understand and carry out the soldering process	1 Recognize the importance of: proper solder alloy, cleanliness and heat control used through out the soldering process. 1 Recognize the importance of ROHs compliance in the workplace.
3. interpret and apply basic blueprint and documentation knowledge, as it pertains to electronic assembly.	1 Interpret documentation provided to carry out soldering assignments.

4. perform basic soldering/de-soldering skills following specified industry approved standards of workmanship.	<ul style="list-style-type: none"> 1 Carry out assignments that involve working to industry standards for projects involving stranded wire preparation and termination.
5. perform soldering/de-soldering skills on Printed Circuit Boards.	<ul style="list-style-type: none"> 1 Employ techniques to install, terminate, solder/de-solder electronic components to a Through-Hole Printed Circuit Board (PCB). 1 Build a functional unit that the student will retain possession of. 1 Employ techniques to handle and hand solder Surface Mount Devices to a Printed Circuit Board. 1 Basic modifications will be done on both types of technology boards.

LEARNING RESOURCES

Course notes will be posted on blackboard for students.
Precision Hand Tools - see (or contact) instructor prior to purchasing. Tools include diagonal wire cutters (narrow jaw width), needle-nose pliers (narrow jaw width), and wire strippers (adjustable)

LEARNING ACTIVITIES

<p>During this course, you are likely to experience the following learning activities:</p> <p>Practical assignments will be carried out, based on: reading material in the manual, a brief lecture and a practical demonstration by the professor at the start of class.</p>

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
Work habits 10%	<ul style="list-style-type: none"> 1 demonstrate acceptable safety practices at all times in a lab environment - [CLR 1] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6]
Projects 40% There are approximately 12 individually weighted projects; as outlined in the CSI.	<ul style="list-style-type: none"> 1 perform soldering/de-soldering skills on Printed Circuit Boards. - [CLR 5] 1 demonstrate acceptable safety practices at all times in a lab environment - [CLR 1] 1 understand and carry out the soldering process - [CLR 2] 1 interpret and apply basic blueprint and documentation knowledge, as it pertains to electronic assembly. - [CLR 3] 1 perform basic soldering/de-soldering skills following specified industry approved standards of workmanship. - [CLR 4] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6]
Final written test 20%	<ul style="list-style-type: none"> 1 demonstrate acceptable safety practices at all times in a lab environment - [CLR 1] 1 understand and carry out the soldering process - [CLR 2] 1 interpret and apply basic blueprint and documentation knowledge, as it pertains to electronic assembly. - [CLR 3]
Logic Probe Project -- 30%	<ul style="list-style-type: none"> 1 demonstrate acceptable safety practices at all times in a lab environment - [CLR 1] 1 understand and carry out the soldering process - [CLR 2] 1 perform basic soldering/de-soldering skills following specified industry approved standards of workmanship. - [CLR 4] 1 Manage the use of time and other resources to complete projects. - [EES 10]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Performance Test

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

Safety Glasses

Closed-toed shoes

Electronics toolkit consisting of cutters, wire strippers, needlenose pliers, protoboard, small electronic screwdriver kit.

Refer to your CSI under Course Information on Blackboard for the updated Lab and Testing Policy.

Respect for Confidentiality

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

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways

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 very 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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32

<http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

DC and AC Electronics

Mechanical and Transportation Technology

Course Number: ELN9103	Contribution to Program: Vocational	Normative Hours: 135
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 1	Core/Elective: Core
Prepared by: Jim Mikolaitis Professor		Approval Date: 28/08/2012
Co-Requisites MAT8050		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical and Transportation Technology
Pre-Requisites N/A		Approved for Academic Year: 2012-2013

COURSE DESCRIPTION

Emphasis is placed on labs. Areas of study include what electricity is, how it is produced, voltage, current, power, resistance, how to identify and measure the various components, as well as the relationship between them, the theory of alternating current and its special applications in electronic circuits. Topics covered include RMS, average, applied, peak-to-peak and instantaneous values. Lab experiments deal with RC and RL circuits, transformer characteristics and LC filters. RLC circuits, and series and parallel resonance are also covered.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|----|--|
| 2 | Interpret and produce electrical, electronic, and mechanical drawings and other related documents and graphics to appropriate engineering standards.(T,A) |
| 3 | Select and use a variety of troubleshooting techniques and test equipment to assess electromechanical circuits, equipment, processes, systems, and subsystems.(T,A,CP) |
| 5 | Apply the principles of engineering, mathematics, and science to analyze and solve routine technical problems and to complete work related to electromechanical engineering.(T,A,CP) |
| 7 | Analyze, build, and troubleshoot logic and digital circuits, passive AC and DC circuits, and active circuits.(T,A,CP) |
| 14 | Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(T,A) |
| 15 | Develop personal and professional strategies and plans to improve job performance and work relationships with clients, coworkers, and supervisors.(T) |

T: Teach A: Assess CP: Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|----|--|
| 3 | Execute mathematical operations accurately.(T,A,CP) |
| 4 | Apply a systematic approach to solve problems.(T,A,CP) |
| 5 | Use a variety of thinking skills to anticipate and solve problems.(T,A) |
| 8 | Show respect for diverse opinions, values, belief systems and contributions of others. (A) |
| 9 | Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. (A) |
| 11 | Take responsibility for one's own actions, decisions and consequences.(T,CP) |

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
--	--------------------------------------

<p>1. Define Quantities and Units of DC Circuits</p> <p>Define Voltage, Current and Resistance</p> <p>Define Ohm's Law, Energy and Power</p>	<ul style="list-style-type: none"> Express numbers in terms of scientific and engineering notation Express numbers in terms of metric prefixes Convert back and forth between the above Understand and explain how to practice electrical safety Explain the atom and electrical charge Define and measure voltage, current and resistance in a basic electrical circuit Explain the basic electrical circuit Define and Apply Ohm's Law Explain Energy and Power as they apply to the electrical circuit Explain the power rating of resistors Describe the basic approach to troubleshooting
<p>2. Explain Series, Parallel and Series-Parallel Circuits</p>	<ul style="list-style-type: none"> Explain how resistance, current, voltage and power operate and how they are calculated and measured in a series circuit Explain Ohm's Law and Kirchhoff's Voltage Law in the series circuit including voltage dividers Explain how resistance, current, voltage and power operate and how they are calculated and measured in a parallel circuit Explain Ohm's Law and Kirchhoff's Current Law in the parallel circuit including current dividers Identify and Analyse Series-Parallel Circuits Explain the loading effect of a voltmeter Explain and demonstrate various network theorems
<p>3. Explain Alternating Current and Voltage</p> <p>Explain Capacitors and how they Operate in RC Circuits</p>	<ul style="list-style-type: none"> Explain the Sinusoidal Waveform, demonstrate how to measure both current and voltage from the waveform Explain the Sine Wave Formula as it applies to AC Circuit Analysis Explain and demonstrate Nonsinusoidal Waveforms Demonstrate a working knowledge of the Oscilloscope Identify and explain the basic capacitor types and values and how they operate in series and parallel circuits Explain how capacitors operate in DC versus AC circuits Explain the sinusoidal waveform response as well as impedance and phase angles of Series, Parallel, and Series-Parallel RC Circuits Explain Power in an RC Circuit
<p>4. Define Magnetism and Electromagnetism</p> <p>Define Inductors and RL Circuits</p>	<ul style="list-style-type: none"> Explain the Magnetic Field, Electromagnetism and Electromagnetic Devices Explain Magnetic Hysteresis and Electromagnetic Induction Explain the basic inductor, types of inductors and how they are measured and calculated in Series and Parallel circuits Explain the differences in how inductors react in DC and AC Circuits Explain the sinusoidal waveform response as well as impedance and phase angles of Series, Parallel, and Series-Parallel RL Circuits Explain Power in an RL Circuit
<p>5. Demonstrate RLC Circuits and Resonance</p> <p>Explain the Time Response of Reactive Circuits</p>	<ul style="list-style-type: none"> Explain the sinusoidal waveform response as well as impedance and phase angles of Series, Parallel, and Series-Parallel RLC Circuits

Explain Transformers	<ul style="list-style-type: none"> 1 Define the RC Integrator 1 Explain the Response of RC Integrators and Differentiators to Single and Repetitive Pulses 1 Explain the Response of RL Integrators and Differentiators to Pulse Inputs 1 Define Mutual Inductance and the Basic Transformer 1 Define Step-Up and Step-Down Transformers 1 Explain Loading the Secondary, Reflected Load, and Impedance Matching 1 Explain Tapped and Multiple-Winding Transformers
----------------------	--

LEARNING RESOURCES

Electronics Fundamentals: Circuits, Devices and Applications 8th Edition (Required)

ISBN: 0135072956

Author: Floyd Pearson,

Publisher: Pearson

Lab Manual for Electronics Fundamentals 8th Edition (Required)

ISBN: 0135063272

Author: Buchla

Publisher: Pearson

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

Lectures are used to bring forth practical data gathering and outputting to the appropriate device. A large portion of this course is achieved through hands on practical experience. Some peer teaching and collaborative learning may be involved. A complete list of required labs is available on Blackboard.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
Chapter and Lab Tests 85% (17% for each CLR)	<ul style="list-style-type: none"> 1 Explain Alternating Current and Voltage Explain Capacitors and how they Operate in RC Circuits - [CLR 3] 1 Demonstrate RLC Circuits and Resonance Explain the Time Response of Reactive Circuits Explain Transformers - [CLR 5] 1 Define Magnetism and Electromagnetism Define Inductors and RL Circuits - [CLR 4] 1 Define Quantities and Units of DC Circuits Define Voltage, Current and Resistance Define Ohm's Law, Energy and Power - [CLR 1] 1 Explain Series, Parallel and Series-Parallel Circuits - [CLR 2] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
Quizzes 5% 5 Quizzes @ 1% each	<ul style="list-style-type: none"> 1 Explain Alternating Current and Voltage

	<p>Explain Capacitors and how they Operate in RC Circuits - [CLR 3]</p> <p>1 Demonstrate RLC Circuits and Resonance</p> <p>Explain the Time Response of Reactive Circuits</p> <p>Explain Transformers - [CLR 5]</p> <p>1 Define Magnetism and Electromagnetism</p> <p>Define Inductors and RL Circuits - [CLR 4]</p> <p>1 Define Quantities and Units of DC Circuits</p> <p>Define Voltage, Current and Resistance</p> <p>Define Ohm's Law, Energy and Power - [CLR 1]</p> <p>1 Explain Series, Parallel and Series-Parallel Circuits - [CLR 2]</p> <p>1 Execute mathematical operations accurately. - [EES 3]</p> <p>1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8]</p> <p>1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]</p>
<p>Labs 10%</p> <p>(1 Lab Sign Off Sheet worth a total of 10%)</p>	<p>1 Explain Alternating Current and Voltage</p> <p>Explain Capacitors and how they Operate in RC Circuits - [CLR 3]</p> <p>1 Demonstrate RLC Circuits and Resonance</p> <p>Explain the Time Response of Reactive Circuits</p> <p>Explain Transformers - [CLR 5]</p> <p>1 Define Magnetism and Electromagnetism</p> <p>Define Inductors and RL Circuits - [CLR 4]</p> <p>1 Define Quantities and Units of DC Circuits</p> <p>Define Voltage, Current and Resistance</p> <p>Define Ohm's Law, Energy and Power - [CLR 1]</p> <p>1 Explain Series, Parallel and Series-Parallel Circuits - [CLR 2]</p> <p>1 Execute mathematical operations accurately. - [EES 3]</p> <p>1 Apply a systematic approach to solve problems. - [EES 4]</p> <p>1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]</p> <p>1 Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. - [EES 9]</p> <p>1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]</p> <p>1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8]</p>

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

B-	70-72%	2.7	D-	50-52%	1.0
			F	0-49%	0
			FSP	0	0

OTHER COURSE 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.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

Safety Glasses

Closed-toed shoes

Electronics toolkit consisting of cutters, wire strippers, needlenose pliers, protoboard, small electronic screwdriver kit, 2 oscilloscope leads, 2 BNC to alligator leads and 3 sets of meter leads. Wait until after first day of classes for more detailed information regarding the tool-kit, BEFORE you purchase any tools.

Refer to your CSI under Course Information on Blackboard for the updated Lab and Testing Policy.

If you are a student with a disability please identify your needs to the professor and/or the Centre for Students with Disabilities (CSD) so that support services can be arranged for you. You can do this by making an appointment at the CSD, Room C142, Ottawa, 727-4723, Ext 7683 or arranging a personal interview with the professor to discuss your needs.

Respect for Confidentiality

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.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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

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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational

institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Circuit Applications

Mechanical and Transportation Technology

Course Number: ELN9192	Contribution to Program: Vocational	Normative Hours: 90
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 2	Core/Elective: Core
Prepared by: Steven Walford Professor		Approval Date: 24/06/2012
Co-Requisites N/A		Approved by: Misheck Mwaba, Ph.D., P.Eng. Chair, Mechanical & Transportation Technology
Pre-Requisites ELN9103		Approved for Academic Year: 2012-2013

COURSE DESCRIPTION

This is an intense theory and lab course offered in an independent learning mode. The properties and uses of semi-conductors are related to solid-state devices, diodes, transistors and integrated circuits. Lab experiments examine and illustrate the proper use of semi-conductor components. Components are then tied together to form amplifiers, operational amplifiers and power supplies. The course is built on a series of modules, where each module is a building block for the next. Analytical skills and troubleshooting skills are further developed through the use of experiments. The theory and experience used have widespread applications in electronics.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|----|---|
| 2 | Interpret and produce electrical, electronic, and mechanical drawings and other related documents and graphics to appropriate engineering standards.(T) |
| 3 | Select and use a variety of troubleshooting techniques and test equipment to assess electromechanical circuits, equipment, processes, systems, and subsystems.(T,A,CP) |
| 4 | Modify, maintain, and repair electrical, electronic, and mechanical components, equipment, and systems to ensure that they function according to specifications.(T,A,CP) |
| 5 | Apply the principles of engineering, mathematics, and science to analyze and solve routine technical problems and to complete work related to electromechanical engineering.(T) |
| 6 | Assist in the specification of manufacturing materials, processes, and operations to support the design and production of mechanical components.(T) |
| 7 | Analyze, build, and troubleshoot logic and digital circuits, passive AC and DC circuits, and active circuits.(T,A,CP) |
| 8 | Apply, install, test, and troubleshoot a variety of mechanical, electrical, and electronic control systems.(T) |
| 9 | Install and troubleshoot basic computer hardware and programming to support the electromechanical engineering environment.(T,A) |
| 14 | Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(T,A,CP) |
| 15 | Develop personal and professional strategies and plans to improve job performance and work relationships with clients, coworkers, and supervisors.(T,A) |

T: Teach **A:** Assess **CP:** Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|---|--|
| 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,CP) |
| 3 | Execute mathematical operations accurately.(T,A,CP) |
| 4 | Apply a systematic approach to solve problems.(A) |

5	Use a variety of thinking skills to anticipate and solve problems.(A)
6	Locate, select, organize and document information using appropriate technology and information systems.(T,A)
7	Analyze, evaluate and apply relevant information from a variety of sources.(T,A)
8	Show respect for diverse opinions, values, belief systems and contributions of others. (T)
11	Take responsibility for one's own actions, decisions and consequences.(T,A,CP)

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Construct circuits using diodes and transistors and explain their various applications	<ul style="list-style-type: none"> 1 Demonstrate the diode in terms of its characteristics and its uses as a rectifier and in power supplies 1 Explain the different types of Special Purpose diodes 1 Demonstrate the DC operation of a Bipolar Junctions Transistor (BJT) 1 Identify Class A and Class B Amplifiers 1 Demonstrate the use of a BJT as a switch 1 Explain the DC operation of a Field Effect Transistor (FET) 1 Demonstrate the use of a FET as an amplifier and as a feedback oscillator
2. Construct circuits using the operational amplifier and explain the basic uses of the op-amp.	<ul style="list-style-type: none"> 1 Explain the Differential Amplifier, Op-Amp Parameters and Negative Feedback 1 Describe the various Op-Amp Configurations with Negative Feedback and explain what is meant by Op-Amp impedances 1 Explain and demonstrate Comparators, Summing Amplifiers, Integrators and Differentiators, Oscillators, Active Filters and Voltage Regulators as they relate to the Op-Amp
3. Explain the different types of special purpose op-amp circuits and the various methods used for measurement, conversion and control	<ul style="list-style-type: none"> 1 Explain instrumentation, isolation and operational transconductance amplifiers 1 Explain active diode circuits 1 Demonstrate current sources and converters 1 Explain various types of measurement circuits including: temperature, strain, pressure, flow rate and motion 1 Explain different types of circuits including: Sample and Hold, Analog to Digital and Power-Control
4. Demonstrate and Explain the Basic Uses of Labview	<ul style="list-style-type: none"> 1 Explain the term VI, Identify and explain the Front Panel, the Block Diagram and the various controls on the Control and Functions Palettes as well as Express VIs 1 Demonstrate how to customize an existing VI and how to create one from scratch. Demonstrate use of the loop and the Error List Window, how to control the speed of execution and how to use a table to display data. Demonstrate how to use the Help Window. 1 Demonstrate how to build an Analysis Virtual Instrument by adding one and two signals, filtering a signal, and how to add warning lights during compare instructions. Demonstrate how to save data to a file and how to pick specific values to save to a file and finally how to retrieve that information.

LEARNING RESOURCES

Electronics Fundamentals: Circuits, Devices and Applications 8th Edition (Required)

ISBN: 0135072956

Author: Floyd Publisher: Pearson

Lab Manual for Electronics Fundamentals 8th Edition (Required)

ISBN: 0135063272

Author: Buchla Publisher: Pearson

Getting Started with Labview Tutorial available in Labview

Documents as posted on Blackboard.

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

Lectures are used to bring forth practical data gathering and outputting to the appropriate device. A large portion of this course is achieved by hands on practical experience. Some peer teaching and collaborated learning may be involved. A complete list of required labs is available on blackboard.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
<p>Chapter Tests 70%</p> <p>Tests include theory and practical with the following weights:</p> <p>CLR1 - 20%</p> <p>CLR2 - 20%</p> <p>CLR3 - 20%</p> <p>CLR4 - 10%</p>	<ul style="list-style-type: none"> 1 Construct circuits using the operational amplifier and explain the basic uses of the op-amp. - [CLR 2] 1 Explain the different types of special purpose op-amp circuits and the various methods used for measurement, conversion and control - [CLR 3] 1 Demonstrate and Explain the Basic Uses of Labview - [CLR 4] 1 Construct circuits using diodes and transistors and explain their various applications - [CLR 1] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
<p>Labs 26%</p> <p>8% for Sign Off Sheets (4 CLR Sign Off Sheets at 2% each)</p> <p>18% for lab experiments (18 labs at 1% each)</p>	<ul style="list-style-type: none"> 1 Construct circuits using the operational amplifier and explain the basic uses of the op-amp. - [CLR 2] 1 Explain the different types of special purpose op-amp circuits and the various methods used for measurement, conversion and control - [CLR 3] 1 Demonstrate and Explain the Basic Uses of Labview - [CLR 4] 1 Construct circuits using diodes and transistors and explain their various applications - [CLR 1] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]

	<ul style="list-style-type: none"> 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
<p>Quizzes 4%</p> <p>1 Quiz for each CLR (4 Quizzes at 1% each)</p>	<ul style="list-style-type: none"> 1 Construct circuits using the operational amplifier and explain the basic uses of the op-amp. - [CLR 2] 1 Explain the different types of special purpose op-amp circuits and the various methods used for measurement, conversion and control - [CLR 3] 1 Demonstrate and Explain the Basic Uses of Labview - [CLR 4] 1 Construct circuits using diodes and transistors and explain their various applications - [CLR 1] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Challenge Exam

- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

Safety Glasses

Closed-toed shoes

Electronics toolkit consisting of cutters, wire strippers, needlenose pliers, protoboard, small electronic screwdriver kit, 2 oscilloscope leads, 2 BNC to alligator leads and 3 sets of metre leads.

Refer to your CSI under Course Information on Blackboard for the updated Lab and Testing Policy.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways

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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Mechanisms

Mechanical and Transportation Technology

Course Number: ELN9206	Contribution to Program: Vocational	Normative Hours: 30
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 4	Core/Elective: Core
Prepared by: Stephen Ryan Coordinator/EMET-Robotics		Approval Date: 15/06/2012
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical & Transportation Technology
Pre-Requisites N/A		Approved for Academic Year: 2012-2013

COURSE DESCRIPTION

Students are exposed to a variety of mechanical components found in almost all machines. These components include bearings, seals, shafts and keys, couplings, brakes, and clutches and threaded fasteners. Types of friction and lubrication are introduced.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|----|--|
| 2 | Interpret and produce electrical, electronic, and mechanical drawings and other related documents and graphics to appropriate engineering standards.(A,CP) |
| 6 | Assist in the specification of manufacturing materials, processes, and operations to support the design and production of mechanical components.(T,A,CP) |
| 10 | Maintain and troubleshoot automated equipment including robotic systems.(T,CP) |
| 12 | Select for purchase electromechanical equipment, components, and systems that fulfill the job requirements and functional specifications.(T,A) |

T: Teach A: Assess CP: Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|----|---|
| 6 | Locate, select, organize and document information using appropriate technology and information systems.(T,A,CP) |
| 7 | Analyze, evaluate and apply relevant information from a variety of sources.(T,A,CP) |
| 10 | Manage the use of time and other resources to complete projects.(CP) |
| 11 | Take responsibility for one's own actions, decisions and consequences.(A,CP) |

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Understand Fasteners	<ul style="list-style-type: none"> 1 Awareness of the evolvement of standardization relating to fasteners. 1 Identification of the parts of a screw head, including the helix, root, crest, pitch and thread angle. 1 Compare the advantages and disadvantages between coarse vs. fine threads. 1 Interpret fastener specifications, for metric and SAE bolts.

	<ul style="list-style-type: none"> 1 Recognize common industrial threaded-type fasteners. 1 Awareness of the common methods used to remove a damaged fastener
2. Investigate the types of friction and lubricants. Evaluate suitability of lubricants to control friction.	<ul style="list-style-type: none"> 1 Awareness of the role that lubricants play in the reduction of friction, the prevention of wear and corrosion and to protect against contamination 1 Understand how lubricants work and be aware of the roles that additives and inhibitors play in factors such as viscosity, temperature, shearing etc. 1 Analyze an application and correctly determine whether grease or oil is the best choice of lubricant. 1 Recognize various methods of lubricant application.
3. Explain the differences between friction and antifriction bearings and how they are maintained.	<ul style="list-style-type: none"> 1 Understand the role that bearings play in the reduction of friction. 1 Describe the two basic categories of bearings. 1 Explain why bearings need lubrication. 1 Understand the importance of choosing a suitable bearing type to suit radial, axial or combinational load applications. 1 Understand the function of bearing seals. 1 Describe the common methods to install and troubleshoot industrial bearings.
4. For any given application, identify the appropriate seal, and provide rationale for the choice.	<ul style="list-style-type: none"> 1 Describe different types of seals. 1 Based on specific criteria, choose either a dynamic or static sealing. 1 Describe and explain the role of a gasket when assembling a machine part. 1 Describe and know the application for a stuffing box. 1 Knowledge of the differences between mechanical seals and packing seals.
5. Determine the principles of belt drive operation.	<ul style="list-style-type: none"> 1 Understand the theory of belt drive power transmission. 1 Knowledge of the difference between friction drive and positive drive belts. 1 Identify belt sizing and type by coding on belt. 1 Awareness of the importance of tension and alignment of belts to pulleys in replacement or overhaul.
6. Understand the use of different types of couplings.	<ul style="list-style-type: none"> 1 Comprehend the principle of connecting rotating shafts through the use of couplings. 1 Identify and know the advantages and disadvantages of commonly used industrial couplings. 1 Identify the class and individual parts of a coupling. 1 Determine and identify the different types of misalignment.
7. Understand the use of different types of clutches and brakes.	<ul style="list-style-type: none"> 1 Appreciate the differences of clutches and brakes. 1 Identify and describe common types, operation and application of clutches. 1 Familiarization with basic maintenance and troubleshooting methods for clutches and brakes.

LEARNING RESOURCES

Industrial Mechanics and Maintenance/Larry Chastain.-3rd edition. ISBN-13: 978-0-13-515096-2

Various types of online sources (refer to Blackboard and the CSI for specifics)

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

On-line exercises

Internet research

Online quizzes and tests for each of the seven course learning requirements.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:

There are seven online quizzes, one for each of the CLRs. They are based on various online information sources. Each quiz is worth 6% for a total of 42% of your final mark.

There are also seven online tests, one for each of the CLRs. They are based on your textbook readings. Each test is worth approximately 8.3% for a total of 58% of your final mark.

This activity validates the following Course Learning Requirements and/or Essential Employability Skills:

- 1 Understand the use of different types of couplings. - [CLR 6]
- 1 Understand Fasteners - [CLR 1]
- 1 Investigate the types of friction and lubricants. Evaluate suitability of lubricants to control friction. - [CLR 2]
- 1 Explain the differences between friction and antifriction bearings and how they are maintained. - [CLR 3]
- 1 For any given application, identify the appropriate seal, and provide rationale for the choice. - [CLR 4]
- 1 Determine the principles of belt drive operation. - [CLR 5]
- 1 Understand the use of different types of clutches and brakes. - [CLR 7]
- 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
- 1 Manage the use of time and other resources to complete projects. - [EES 10]
- 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6]
- 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio

- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

As this course is totally "on-line" learning in nature, communication with the professor is crucial. Bb (BlackBoard) is the essential means of communication. The student must ensure that they are aware of the time constraints to complete the online evaluation quizzes and tests. The evaluation tools will only be available on specific dates at set times.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology' s Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology' s Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

Students are required to respect the confidentiality of employer, client and/or patient information, interactions, and practices that occur either on AlgonquinCollege 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

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 very 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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:**Email**

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Communications I

Applied Science and Environmental Technology

Course Number: ENL1813T	Contribution to Program: Vocational	Normative Hours: 45
Applicable Program(s): Multiple Programs	AAL: Multiple Levels	Core/Elective: Multiple Core/Elective
Prepared by: Patrick Dawson Coordinator, English FCTT	Approval Date: 24/05/2012	
Co-Requisites N/A	Approved by: Christopher Janzen Chair, Applied Science & Environmental Technology	
Pre-Requisites N/A	Approved for Academic Year: 2012-2013	

COURSE DESCRIPTION

Communication remains an essential skill sought by employers, regardless of discipline or field of study. Using a practical, vocation-oriented approach, students focus on meeting the requirements of effective communication. Through a combination of lectures, exercises, and independent learning, students practise writing, speaking, reading, listening, locating and documenting information, and using technology to communicate professionally. Students develop and strengthen communication skills that contribute to success in both educational and workplace environments.

ESSENTIAL EMPLOYABILITY SKILLS

The course contributes to your program by helping you achieve the following Essential Employability Skills:	
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)
2	Respond to written, spoken or visual messages in a manner that ensures effective communication.(T,A)
6	Locate, select, organize and document information using appropriate technology and information systems.(T,A)
7	Analyze, evaluate and apply relevant information from a variety of sources.(T,A)

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. plan, write, revise and edit short documents and messages that are organized, complete and tailored to specific audiences.	<ul style="list-style-type: none"> 1 identify audience and purpose. 1 select the appropriate mode for delivering the message. 1 recognize and use basic patterns of standard English. 1 format and write short documents such as routine correspondence, paragraphs, and short essays or reports. 1 edit and proofread documents to eliminate errors.
2. plan and deliver short, organized spoken messages and oral reports tailored to specific audiences and purposes.	<ul style="list-style-type: none"> 1 choose appropriate format and structure for the purpose and audience. 1 plan and organize messages and reports. 1 use strategies to overcome speaking anxiety. 1 use verbal and nonverbal techniques to enhance spoken messages. 1 incorporate cues and transitions to guide listeners. 1 respect time allocations.
3. interpret and reframe information gained from spoken messages in	<ul style="list-style-type: none"> 1 identify and practise effective listening strategies.

ways that show accurate analysis and comprehension.	<ul style="list-style-type: none"> 1 identify barriers to effective listening. 1 summarize and paraphrase information gained through listening. 1 reformat information received through listening to another medium.
4. use effective reading strategies to collect and reframe information from a variety of written materials accurately.	<ul style="list-style-type: none"> 1 separate main ideas from subordinate ideas in written materials. 1 identify the organizational structure of a variety of written messages. 1 read with a purpose to identify needed information. 1 paraphrase, summarize and reformat information collected from written materials.
5. locate, select and organize task-relevant and accurate information drawn from a variety of sources.	<ul style="list-style-type: none"> 1 select and use databases to find information. 1 locate prescribed sources of information. 1 distinguish between primary and secondary sources. 1 evaluate the relevance and validity of information. 1 assess and choose information sources appropriate to the purpose and task. 1 compile and organize information.
6. integrate and document information using commonly accepted citation guidelines.	<ul style="list-style-type: none"> 1 credit other's work or ideas to avoid plagiarism. 1 incorporate research information in written materials and oral messages. 1 use strategies to identify and avoid plagiarism. 1 identify acceptable citation guidelines. 1 cite sources correctly.
7. select and use common, basic, information technology tools to support communication.	<ul style="list-style-type: none"> 1 identify common technology tools used to support communication. 1 select the technology appropriate for the task. 1 use word processing software to write short documents and routine correspondence.

LEARNING RESOURCES

Please check with your instructor before buying textbooks. She or he may specify a required text.

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

- 1 Exercises and assignments to improve your ability to write effective sentences, paragraphs, and reports
- 1 Presentations and reports using appropriate methods of development
- 1 Writing, revising, and editing of drafts with particular attention to grammar, syntax, punctuation, and spelling
- 1 Exercises in writing concise notes and summaries
- 1 Exercises and/or tests in reading comprehension
- 1 Exercises in conducting research to gather information
- 1 Exercises in giving oral summaries and reports
- 1 Participation in class discussions
- 1 At least one formal oral presentation within a classroom setting
- 1 Writing letters and memoranda using standard formats
- 1 A letter of application and resume
- 1 Research activities
- 1 Planning, writing, revising, and editing written work
- 1 Summarizing written and spoken material
- 1 Using information technology (computers, email)
- 1 Reading assigned material
- 1 Evaluation and assessment in a variety of college contexts
- 1 Collaborative assignments

Although the skills in the course outline are listed separately, they are not treated separately in the classroom. Each assignment will, wherever possible, involve several skills while emphasizing the development of one skill. The student will acquire language skills by reading, writing, listening, and speaking in a real-time environment -- in short, by being part of the learning process, not by being a passive recipient of information.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
written assignments representing 40% of the course grade.	<ul style="list-style-type: none"> 1 plan, write, revise and edit short documents and messages that are organized, complete and tailored to specific audiences. - [CLR 1] 1 select and use common, basic, information technology tools to support communication. - [CLR 7] 1 interpret and reframe information gained from spoken messages in ways that show accurate analysis and comprehension. - [CLR 3] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2]
public speaking activities representing 30% of the course grade.	<ul style="list-style-type: none"> 1 select and use common, basic, information technology tools to support communication. - [CLR 7] 1 plan and deliver short, organized spoken messages and oral reports tailored to specific audiences and purposes. - [CLR 2] 1 interpret and reframe information gained from spoken messages in ways that show accurate analysis and comprehension. - [CLR 3] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]
participation in class activities representing 10% of the course grade	<ul style="list-style-type: none"> 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2]
research assignments representing 20% of the course grade.	<ul style="list-style-type: none"> 1 interpret and reframe information gained from spoken messages in ways that show accurate analysis and comprehension. - [CLR 3] 1 use effective reading strategies to collect and reframe information from a variety of written materials accurately. - [CLR 4] 1 locate, select and organize task-relevant and accurate information drawn from a variety of sources. - [CLR 5] 1 integrate and document information using commonly accepted citation guidelines. - [CLR 6] 1 select and use common, basic, information technology tools to support communication. - [CLR 7] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

Final Grade	Mark Equivalent	Numeric Value	Final Grade	Mark Equivalent	Numeric Value
A+	90-100%	4.0	C+	67-69%	2.3
A	85-89%	3.8	C	63-66%	2.0

A-	80-84%	3.6	C-	60-62%	1.7
B+	77-79%	3.3	D+	57-59%	1.4
B	73-76%	3.0	D	53-56%	1.2
B-	70-72%	2.7	D-	50-52%	1.0
			F	0-49%	0
			FSP	0	0

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
 - 1 Other
- An interview, and/or a written test of writing competency, and/or a live presentation to confirm oral presentation competency, may be requested to confirm any documentation presented in a portfolio.

RELATED INFORMATION

The following information is course-specific:

In order to receive credit for the course, you must satisfactorily complete all course learning requirements.

The following information is school/department-specific:

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA 18(http://www2.algonquincollege.com/directives/files/2011/01/AA-18-Academic-Dishonesty-and-Discipline.PEC_Approved-Oct.27.2010.pdf) and E43 (<http://www2.algonquincollege.com/directives/files/2011/05/E431.pdf>)

Course Assessments*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Directive E38 (<http://www2.algonquincollege.com/directives/files/2010/09/E38.pdf>)

Use of Electronic Devices*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Directive E39 (<http://www2.algonquincollege.com/directives/files/2010/09/E39.pdf>)

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Machine Shop

Mechanical and Transportation Technology

Course Number: MAC9200	Contribution to Program: Vocational	Normative Hours: 90
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 2	Core/Elective: Core
Prepared by: James Standing Professor		Approval Date: 24/06/2012
Co-Requisites N/A		Approved by: Misheck Mwaba, Ph.D., P.Eng. Chair, Mechanical & Transportation Technology
Pre-Requisites MAT8001		Approved for Academic Year: 2012-2013

COURSE DESCRIPTION

The principles of machining are covered. Focus is on metal removal operations and the selection of machine tools for specific operations, including the use of drill presses, lathes, milling machines, and grinders and jig borers.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|----|---|
| 5 | Apply the principles of engineering, mathematics, and science to analyze and solve routine technical problems and to complete work related to electromechanical engineering.(T,A) |
| 6 | Assist in the specification of manufacturing materials, processes, and operations to support the design and production of mechanical components.(T,A) |
| 14 | Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(T,A) |

T: Teach **A:** Assess **CP:** Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|----|--|
| 3 | Execute mathematical operations accurately.(T,A) |
| 4 | Apply a systematic approach to solve problems.(T,A) |
| 5 | Use a variety of thinking skills to anticipate and solve problems.(T,A) |
| 7 | Analyze, evaluate and apply relevant information from a variety of sources.(T,A) |
| 10 | Manage the use of time and other resources to complete projects.(T,A) |
| 11 | Take responsibility for one's own actions, decisions and consequences.(T,A) |

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Practice Machine Shop Safety.	<ul style="list-style-type: none"> 1 Familiarity with shop features, power panels, fire extinguishers, machine guarding. 1 House keeping issues. 1 Personal safety equipment and clothing. 1 Behaviour in the shop.

2. Identify, select and use appropriate hand tools and layout tools.	<ul style="list-style-type: none"> 1 Hammers, bench vices, wrenches, screw drivers, saws, files, taps, dies and reamers. 1 Layout dye, surface plates, layout tables, scribe, divider, punches and accessories.
3. Select and use proper measuring tools.	<ul style="list-style-type: none"> 1 Micrometer measuring tools, vernier tools, dial indicators, steel rule, combination sets, precision square, thread pitch gauges, telescopic and small hole gauges.
4. Read and interpret reference tables, charts and drawing information.	<ul style="list-style-type: none"> 1 Conversion tables, speeds and feeds, tap drill sizes. 1 Extract production information from engineering drawings.
5. Set up and operate Drill Presses.	<ul style="list-style-type: none"> 1 Machine safety concerns. 1 Select tooling and perform proper set ups. 1 Calculate proper RPM. 1 Operation principles. 1 Perform drilling and machine reaming.
6. Set up and operate Engine Lathes.	<ul style="list-style-type: none"> 1 Machine safety concerns. 1 Naming of major parts and controls. 1 Operation principles. 1 Select tooling and perform proper set ups. 1 Calculate proper RPM. 1 Perform facing, turning, drilling, machine reaming, threading, tapping and counterboring.
7. Set up and operate Milling Machines.	<ul style="list-style-type: none"> 1 Machine safety concerns. 1 Naming of major parts and controls. 1 Operation principles. 1 Select tooling and perform proper set ups. 1 Calculate proper RPM and Feed Rates. 1 Perform roughing and finishing cutting, use of an edge finding tool, tooling offsets, indexing and drilling.
8. Operate a Pedestal Grinder.	<ul style="list-style-type: none"> 1 Produce a Tool Bit for the Engine Lathe.

LEARNING RESOURCES

Textbook -
THE HOME MACHINIST'S HANDBOOK
Author: DOUG BRINEY
ISBN: 0 – 8306 – 1573 – 3
MCGRAW HILL

Teachers notes (Power Points) and handouts (Shop Drawings of Projects)

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

Samples of learning activities include;
Demonstrations, Verbal instructions, Workshop applications and Self learning.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
2 Plates (helix coil) 15% of Final Grade	<ul style="list-style-type: none"> 1 Identify, select and use appropriate hand tools and layout tools. - [CLR 2] 1 Set up and operate Milling Machines. - [CLR 7] 1 Practice Machine Shop Safety. - [CLR 1]

	<ul style="list-style-type: none"> 1 Select and use proper measuring tools. - [CLR 3] 1 Read and interpret reference tables, charts and drawing information. - [CLR 4] 1 Set up and operate Drill Presses. - [CLR 5] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4]
Final Test 10% of Final Grade	<ul style="list-style-type: none"> 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]
Work Habits and Attendance 10% of Final Grade	<ul style="list-style-type: none"> 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
Drill Point Gauge shop project 5% of Final Grade	<ul style="list-style-type: none"> 1 Select and use proper measuring tools. - [CLR 3] 1 Read and interpret reference tables, charts and drawing information. - [CLR 4] 1 Set up and operate Drill Presses. - [CLR 5] 1 Practice Machine Shop Safety. - [CLR 1] 1 Identify, select and use appropriate hand tools and layout tools. - [CLR 2] 1 Execute mathematical operations accurately. - [EES 3]
Toolbit for engine lathe 5% of Final Grade	<ul style="list-style-type: none"> 1 Select and use proper measuring tools. - [CLR 3] 1 Read and interpret reference tables, charts and drawing information. - [CLR 4] 1 Practice Machine Shop Safety. - [CLR 1] 1 Operate a Pedestal Grinder. - [CLR 8]
Tests and Quizzes to test key terms and concepts. 20% of Final Grade	<ul style="list-style-type: none"> 1 Identify, select and use appropriate hand tools and layout tools. - [CLR 2] 1 Set up and operate Milling Machines. - [CLR 7] 1 Practice Machine Shop Safety. - [CLR 1] 1 Operate a Pedestal Grinder. - [CLR 8] 1 Select and use proper measuring tools. - [CLR 3] 1 Read and interpret reference tables, charts and drawing information. - [CLR 4] 1 Set up and operate Drill Presses. - [CLR 5] 1 Set up and operate Engine Lathes. - [CLR 6] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]
Machinist Hammer 20% of Final Grade	<ul style="list-style-type: none"> 1 Identify, select and use appropriate hand tools and layout tools. - [CLR 2] 1 Set up and operate Milling Machines. - [CLR 7] 1 Practice Machine Shop Safety. - [CLR 1] 1 Select and use proper measuring tools. - [CLR 3] 1 Read and interpret reference tables, charts and drawing information. - [CLR 4]

	<ul style="list-style-type: none"> 1 Set up and operate Engine Lathes. - [CLR 6] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4]
Hub (Sleeve) 15% of Final Grade	<ul style="list-style-type: none"> 1 Identify, select and use appropriate hand tools and layout tools. - [CLR 2] 1 Set up and operate Milling Machines. - [CLR 7] 1 Select and use proper measuring tools. - [CLR 3] 1 Read and interpret reference tables, charts and drawing information. - [CLR 4] 1 Set up and operate Engine Lathes. - [CLR 6] 1 Practice Machine Shop Safety. - [CLR 1] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Not Applicable

RELATED INFORMATION

The following information is course-specific:

Teacher contact information:

Name: Mr. Gilles Michaud

Office: T215

Phone: 727-4723 ex: 5565

E-mail: gilles.michaud@algonquincollege.com

Name: Richard Lacelle

Office: T215

Phone: 727-4723 ex: 2414

E-mail: lacellr@algonquincollege.com

Respect for Confidentiality

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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways

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 very 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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:**Email**

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Math Fundamentals

Applied Science and Environmental Technology

Course Number: MAT8001	Contribution to Program: Vocational	Normative Hours: 45
Applicable Program(s): Multiple Programs	AAL: Multiple Levels	Core/Elective: Multiple Core/Elective
Prepared by: Mohammed Mostefa Professor		Approval Date: 08/06/2012
Co-Requisites N/A		Approved by: Christopher Janzen Chair, Applied Science & Environmental Technology
Pre-Requisites N/A		Approved for Academic Year: 2012-2013

COURSE DESCRIPTION

Students learn foundational mathematics required in many College technical programs. Students also solve measurement problems involving a variety of units and ratio and proportion problems. They manipulate algebraic expressions and solve equations. Students evaluate exponential and logarithmic expressions, study the trigonometry of right triangles and graph a variety of functions.

ESSENTIAL EMPLOYABILITY SKILLS

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

- 3 Execute mathematical operations accurately.(T,A)
- 4 Apply a systematic approach to solve problems.(T,A)
- 5 Use a variety of thinking skills to anticipate and solve problems.(T,A)

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Perform basic algebraic operations with signed numbers.	<ul style="list-style-type: none"> 1 Perform basic mathematical operations such as addition, subtraction, multiplication, division and apply the rule of order of operations on numerical expressions. 1 Express numbers in scientific notation. 1 Express numbers in engineering notation.
2. Solve a variety of measurement problems.	<ul style="list-style-type: none"> 1 Convert units of measure within and between the US Customary (in, ft, mile, lb, ° F) and metric system (m, g, s, F, H, °C). 1 Convert units of linear measure, area and volume. 1 Express numbers using significant digits.
3. Perform basic mathematical operations on algebraic expressions.	<ul style="list-style-type: none"> 1 Add, subtract, multiply and divide algebraic expressions.
4. Solve simple equations.	<ul style="list-style-type: none"> 1 Solve simple equations, formulas and literal equations. 1 Solve ratio and proportion problems. 1 Solve equations involving numerical fractions.

5. Graph functions.	<ul style="list-style-type: none"> Express a function using functional notation. Sketch the graph of a function. Graph a linear function. Solve equations graphically.
6. Solve systems of two linear equations in two unknowns.	<ul style="list-style-type: none"> Solve systems of two linear equations in two unknowns using elimination by addition or subtraction.
7. Factor algebraic expressions.	<ul style="list-style-type: none"> Factor algebraic expressions using common factors. Factor trinomials of the form: $x^2 + bx + c$. Factor algebraic expressions using difference of squares.
8. Simplify and perform algebraic operations on numerical and algebraic expressions involving integral and fractional exponents.	<ul style="list-style-type: none"> Apply the laws of exponents to simplify and perform operations on algebraic expressions involving integral and fractional exponents. Write in simplest forms 2nd order radicals. Solve simple equations involving radicals.
9. Solve quadratic equations.	<ul style="list-style-type: none"> Solve quadratic equations by factoring Solve quadratic equations using the quadratic formula.
10. Manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles.	<ul style="list-style-type: none"> Draw an angle in standard position. Calculate the value of the primary (sin, cos, tan) trigonometric functions of an acute angle. Calculate the acute angle given the value of a primary trigonometric function. Solve right triangles using their properties and SOH CAH TOA. Solve applied problems using the trigonometry of the right triangle.
11. Sketch the graph of the sine and cosine functions where angles are expressed in degrees.	<ul style="list-style-type: none"> Calculate the amplitude, phase shift and displacement. Graph of the functions $y = a \sin x$ and $y = a \cos x$. Graph of the functions $y = a \sin bx$ and $y = a \cos bx$. Graph of the functions $y = a \sin(bx + c)$ and $y = a \cos(bx + c)$.
12. Evaluate exponential and logarithmic expressions.	<ul style="list-style-type: none"> Identify the exponential and logarithmic functions. Convert between exponential and logarithmic forms. Simplify logarithmic expressions using the properties of logarithms. Evaluate the logarithm to base 10 and base e.

LEARNING RESOURCES

Pearson Education Custom Package for Algonquin College consisting of:

- 1 Algonquin College custom edition created from "Introduction to Technical Mathematic" 5 e by Washington, Triola, Reda
- 1 Students Solutions Manual
- 1 Technical mathematics Study Card
- 1 MyMathLab Access Kit
- 1 Algonquin College Insert Sheet

Other Required Resources:

Scientific Calculator. Sharp WBK531 is recommended.

NOTE: Graphing calculators are not permitted for use in this course.

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

- 1 class lectures
- 1 discussions
- 1 problem solving activities
- 1 electronic demonstrations
- 1 homework exercises

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
Assignments (four) 20%	<ul style="list-style-type: none"> 1 Perform basic mathematical operations on algebraic expressions. - [CLR 3] 1 Graph functions. - [CLR 5] 1 Perform basic algebraic operations with signed numbers. - [CLR 1] 1 Solve a variety of measurement problems. - [CLR 2] 1 Solve simple equations. - [CLR 4] 1 Solve systems of two linear equations in two unknowns. - [CLR 6] 1 Factor algebraic expressions. - [CLR 7] 1 Simplify and perform algebraic operations on numerical and algebraic expressions involving integral and fractional exponents. - [CLR 8] 1 Manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles. - [CLR 10] 1 Sketch the graph of the sine and cosine functions where angles are expressed in degrees. - [CLR 11] 1 Evaluate exponential and logarithmic expressions. - [CLR 12] 1 Solve quadratic equations. - [CLR 9] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
Final Assessment 30%	<ul style="list-style-type: none"> 1 Factor algebraic expressions. - [CLR 7] 1 Simplify and perform algebraic operations on numerical and algebraic expressions involving integral and fractional exponents. - [CLR 8] 1 Perform basic mathematical operations on algebraic expressions. - [CLR 3] 1 Graph functions. - [CLR 5] 1 Solve simple equations. - [CLR 4] 1 Solve systems of two linear equations in two unknowns. - [CLR 6]

	<ul style="list-style-type: none"> 1 Perform basic algebraic operations with signed numbers. - [CLR 1] 1 Solve a variety of measurement problems. - [CLR 2] 1 Manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles. - [CLR 10] 1 Sketch the graph of the sine and cosine functions where angles are expressed in degrees. - [CLR 11] 1 Evaluate exponential and logarithmic expressions. - [CLR 12] 1 Solve quadratic equations. - [CLR 9] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
Test 1 15% Test 2 15% Quiz 1 5% Quiz 2 5%	<ul style="list-style-type: none"> 1 Solve a variety of measurement problems. - [CLR 2] 1 Perform basic mathematical operations on algebraic expressions. - [CLR 3] 1 Perform basic algebraic operations with signed numbers. - [CLR 1] 1 Factor algebraic expressions. - [CLR 7] 1 Simplify and perform algebraic operations on numerical and algebraic expressions involving integral and fractional exponents. - [CLR 8] 1 Solve simple equations. - [CLR 4] 1 Solve systems of two linear equations in two unknowns. - [CLR 6] 1 Manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles. - [CLR 10] 1 Sketch the graph of the sine and cosine functions where angles are expressed in degrees. - [CLR 11] 1 Evaluate exponential and logarithmic expressions. - [CLR 12] 1 Graph functions. - [CLR 5] 1 Solve quadratic equations. - [CLR 9] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
MyMathLab Quizzes 10%	<ul style="list-style-type: none"> 1 Perform basic algebraic operations with signed numbers. - [CLR 1] 1 Solve simple equations. - [CLR 4] 1 Solve systems of two linear equations in two unknowns. - [CLR 6] 1 Factor algebraic expressions. - [CLR 7] 1 Simplify and perform algebraic operations on numerical and algebraic expressions involving integral and fractional exponents. - [CLR 8] 1 Perform basic mathematical operations on algebraic expressions. - [CLR 3] 1 Graph functions. - [CLR 5] 1 Manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles. - [CLR 10] 1 Sketch the graph of the sine and cosine functions where angles are expressed in degrees. - [CLR 11]

- 1 Evaluate exponential and logarithmic expressions. - [CLR 12]
- 1 Solve quadratic equations. - [CLR 9]
- 1 Execute mathematical operations accurately. - [EES 3]
- 1 Apply a systematic approach to solve problems. - [EES 4]
- 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Other
See College Policy #AA06 for details on eligibility and process. For this course, evidence of learning achievement for PLA candidates will include the successful completion of a challenge exam with a breadth of coverage and level of difficulty equivalent to the final examination in the course.

RELATED INFORMATION

The following information is course-specific:

The course consists of 3 hours of lectures per week. It is anticipated that you will need to spend an additional 3 hours per week, on average, of your own time for homework exercises and study. The students' ability to successfully complete the homework exercises will directly correlate with their level of success on assignments, quizzes, tests and the final assessment. Failure to do homework exercises may mean you are unable to complete similar questions found on assignments, quizzes, tests and the final assessment.

During this course you are likely to experience:

Lectures:

Lectures will present the theoretical material of the course.

- 1 Students are expected to attend all of the lectures.
- 1 Course material will be presented, aided by use of overhead projections, demonstrations and brief lecture notes during lectures. Students are expected to prepare their own personal notes and are responsible for all the material presented. If you miss a class, make sure you get the relevant notes from another student before the next class
- 1 Students are expected to read and understand specific sections of the textbook as indicated in the course syllabus, which will be provided by the course professor.
- 1 Students will be expected to ask for clarification and explanations as required.
- 1 Students are encouraged to ask questions during lectures and to consult with the professor on topics that they do not clearly understand. The course material is cumulative and does not lend itself well to "cramming" at the last minute. Ask your questions early and often.
- 1 The professor will inform students, at the beginning of the course, of suitable times for consultation.

In order to pass the course, the student must have a grade of at least 50% or "D-" on assignments, tests, quizzes and the final exam combined. For a complete breakdown of the grading system, please refer to college directive E-11.

Late assignments will not be accepted for submission and will receive a mark of zero.

The final assessment is designed to be a comprehensive, summative evaluation instrument. If, as a result of being off-track in your program or some unforeseen circumstance, you note that there is a scheduling conflict in your final assessment schedule, it is your responsibility to alert your course professor no later than one week before final assessments start, to allow for any special arrangements.

In the case of a documented emergency that causes a student to miss a quiz, class test or final assessment, the professor in consultation with the Chair, as required, will determine how the marks will be made up and/or final grade adjusted.

Retention of course material. It is your responsibility to retain copies of all assignments, quizzes and mid-term tests (returned from the professor), and any other evaluations and pertinent records (except for final exams, which are not returned) in case you become involved in an appeal hearing at a later date.

It is also your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

See College Policies #AA19 or #AA37 for details.

The following information is school/department-specific:

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Sustainability in Today's Modern World

Mechanical and Transportation Technology

Course Number: PHY9182	Contribution to Program: General Education	Normative Hours: 45
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 2	Core/Elective: Core
Prepared by: Joel Smith Instructor		Approval Date: 04/01/2013
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical and Transportation Technology
Pre-Requisites N/A		Approved for Academic Year: 2012-2013

COURSE DESCRIPTION

Social and economics aspects of sustainability are examined. Students explore a variety of topics that examine the ethics of current industry and how one issue can affect many other elements. Topics include: what is sustainability; how does it affect me in my home, my employer and our government. Sustainability is it economically feasible. Making informed choices about sustainability for green energy, waste control and water conservation can only improve the planet.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This is a general education course that supports learning in the following theme area: **Science and Technology**

T: Teach A: Assess CP: Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

The course contributes to your program by helping you achieve the following Essential Employability Skills:	
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,CP)
2	Respond to written, spoken or visual messages in a manner that ensures effective communication.(T)
4	Apply a systematic approach to solve problems.(T,CP)
5	Use a variety of thinking skills to anticipate and solve problems.(T,CP)
7	Analyze, evaluate and apply relevant information from a variety of sources.(T,CP)
8	Show respect for diverse opinions, values, belief systems and contributions of others. (T)
10	Manage the use of time and other resources to complete projects.(T)
11	Take responsibility for one's own actions, decisions and consequences.(T,A,CP)

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Examine what the definition of sustainability means.	<ul style="list-style-type: none"> 1 Learn how sustainability affects both student life and work life. 1 Assess the benefits as to why sustainability is important to a potential employer. 1 Examine the true history of how society has moved towards operating in a more sustainable way.
2. Discuss the past and present ethics of current industry.	<ul style="list-style-type: none"> 1 The impact of sourcing specific materials. 1 The safety of products that are currently in use.

	<ul style="list-style-type: none"> 1 Positive/negative impacts from materials that have reached their 'end-of-use'.
3. Weigh the pros and cons of implementing new sustainability models in your current work.	<ul style="list-style-type: none"> 1 Local, national, and international laws are examined. 1 Protecting your work outside your own country. 1 Open source licenses. 1 Dealing with various copyrights, patents and trade secrets. 1 Understanding key responsibilities of engineers and technicians.
4. Work through approaches to solving current world problems.	<ul style="list-style-type: none"> 1 Gather information from the internet, honestly and quickly. 1 Assess the accuracy, quality, and validity of the information. 1 Determine the best solution based on cost & environmental impact. 1 Meet deadlines.
5. Evaluate the current state of industry and today's manufactures.	<ul style="list-style-type: none"> 1 Learn to maximize the cycle of innovation 1 Examine how, as a society, we ended up where we are. 1 Examine the basic lifecycle model. 1 Examine mini-lifecycles of consumables as well as various supply chains. 1 Examine Hidden impacts & services while looking at the design and prototypes of various products.

LEARNING RESOURCES

An electronic version of the textbook is made available online. Different internet medias are used for case studies.

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

- 1 Independent research
- 1 Apply class material to real life scenarios
- 1 Completing online exercises and quizzes
- 1 Searching web sites
- 1 Reflect on real life scenarios and the challenges that face each decision made

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
16 Tests (On-line) Test 1 ----- 3% Test 2 ----- 3% Test 3 ----- 3% Test 4 ----- 3% Test 5 ----- 3% Test 6 ----- 3% Test 7 ----- 3% Test 8 ----- 3% Test 9 ----- 3% Test 10 ----- 3% Test 11 ----- 3% Test 12 ----- 3% Test 13 ----- 3% Test 14 ----- 3% Test 15 ----- 3% Test 16 ----- 3%	<ul style="list-style-type: none"> 1 Examine what the definition of sustainability means. - [CLR 1] 1 Discuss the past and present ethics of current industry. - [CLR 2] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]

Total -----48%	
3 Assignments	
Assignment 1 ----- 15%	
Assignment 2 ----- 15%	
Assignment 3 ----- 22%	
Total----- 52%	
	<ul style="list-style-type: none"> 1 Weigh the pros and cons of implementing new sustainability models in your current work. - [CLR 3] 1 Work thought an approaches to solving current world problems. - [CLR 4] 1 Evaluate the current state of industry and today's manufactures. - [CLR 5] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Other
Please contact the coordinator for more information.

RELATED INFORMATION

The following information is course-specific:

See department related information below.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways

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 very 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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which

solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25
<http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32
<http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Pneumatics

Mechanical and Transportation Technology

Course Number: ROB8201	Contribution to Program: Vocational	Normative Hours: 45
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 1	Core/Elective: Core
Prepared by: Philippe Beaulieu Professor		Approval Date: 24/06/2012
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical & Transportation Technology
Pre-Requisites N/A		Approved for Academic Year: 2012-2013

COURSE DESCRIPTION

Students demonstrate theoretical knowledge through the use of practical pneumatic circuits. Areas of study include designing and building pneumatic circuitry to address specific real-world industrial applications. Topics include but are not limited to units of measure, directional control valves, check valves, limit switches, flow controls and different pneumatic actuators.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- 1 Fabricate mechanical components and assemblies, and assemble electrical components and electronic assemblies by applying workshop skills and knowledge of basic shop practices in accordance with applicable codes and safety practices.(T,A,CP)
- 2 Interpret and produce electrical, electronic, and mechanical drawings and other related documents and graphics to appropriate engineering standards.(T,A,CP)
- 3 Select and use a variety of troubleshooting techniques and test equipment to assess electromechanical circuits, equipment, processes, systems, and subsystems.(T,A,CP)
- 4 Modify, maintain, and repair electrical, electronic, and mechanical components, equipment, and systems to ensure that they function according to specifications.(CP)
- 5 Apply the principles of engineering, mathematics, and science to analyze and solve routine technical problems and to complete work related to electromechanical engineering.(T,A,CP)
- 6 Assist in the specification of manufacturing materials, processes, and operations to support the design and production of mechanical components.(T,A,CP)
- 8 Apply, install, test, and troubleshoot a variety of mechanical, electrical, and electronic control systems.(T,A,CP)
- 10 Maintain and troubleshoot automated equipment including robotic systems.(T,A,CP)
- 12 Select for purchase electromechanical equipment, components, and systems that fulfill the job requirements and functional specifications.(CP)
- 14 Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(T,CP)

T: Teach A: Assess CP: Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience.(A)
- 2 Respond to written, spoken or visual messages in a manner that ensures effective communication.(T,A)
- 3 Execute mathematical operations accurately.(T,A)
- 4 Apply a systematic approach to solve problems.(T)

5	Use a variety of thinking skills to anticipate and solve problems.(T)
6	Locate, select, organize and document information using appropriate technology and information systems.(A)
7	Analyze, evaluate and apply relevant information from a variety of sources.(A,CP)
8	Show respect for diverse opinions, values, belief systems and contributions of others. (A)
9	Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. (A)
10	Manage the use of time and other resources to complete projects.(T,A)
11	Take responsibility for one's own actions, decisions and consequences.(T,A)

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Design and build pneumatic circuits to control actuators involving pushbuttons, detented, direct / indirect memory and logic functions.	<ul style="list-style-type: none"> 1 Understand the principles of pneumatics and pneumatic control of single and double acting cylinders. 1 Use flow controls to control speed and timing. 1 Apply the use of memory, AND and OR logic functions to control actuators.
2. Design and build complex circuits involving a variety of logic, pilot, sequence and timer problems.	<ul style="list-style-type: none"> 1 Use quick exhaust valves in proper situations and use sequence, pressure regulator and timer valves to direct coordinated motion. 1 Use indirect control (pilot operation) to control actuators.

LEARNING RESOURCES

The books for this course are downloadable from FESTO Inc. The website is festodidactic.com. Look under courseware-pneumatics-textbooks or workbooks. The REQUIRED TEXT is #573030. The REQUIRED BOOK of EXERCISES is #541088.

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

The Pneumatics course is decidedly "Hands on" in nature. You will be analyzing, constructing and demonstrating solutions to various real life pneumatic applications. The theory component is closely dovetailed with the lab manual and is presented via practical demonstration and modification of existing student built circuits. Peer discussion and collaboration is encouraged. Safety glasses and appropriate clothing is required.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
There are three tests. They are composed of a written element, a practical element or a combination of both. These three tests are weighted 20%, 20% and 25% respectively of the final grade.	<ul style="list-style-type: none"> 1 Design and build complex circuits involving a variety of logic, pilot, sequence and timer problems. - [CLR 2] 1 Design and build pneumatic circuits to control actuators involving pushbuttons, detented, direct / indirect memory and logic functions. - [CLR 1] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
There is 15% given for the mandatory labwork.	<ul style="list-style-type: none"> 1 Design and build pneumatic circuits to control actuators involving pushbuttons, detented, direct / indirect memory and logic functions. - [CLR 1] 1 Design and build complex circuits involving a variety of logic, pilot, sequence and timer problems. - [CLR 2]

	<ul style="list-style-type: none"> 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
20% of the final grade is given for the "Group Project".	<ul style="list-style-type: none"> 1 Design and build pneumatic circuits to control actuators involving pushbuttons, detented, direct / indirect memory and logic functions. - [CLR 1] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8] 1 Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. - [EES 9] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Equipment Required

Safety Glasses
Closed-Toed Shoes

Refer to your CSI under Course Information on Blackboard for an updated Lab and Testing Policy.

The following information is school/department-specific:**GENERAL CLAUSES - School of Advanced Technology**

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices , with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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

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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:**Email**

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Electro-Pneumatics

Mechanical and Transportation Technology

Course Number: ROB8311	Contribution to Program: Vocational	Normative Hours: 60
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 2	Core/Elective: Core
Prepared by: Philippe Beaulieu Professor		Approval Date: 28/08/2012
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical and Transportation Technology
Pre-Requisites ROB8201		Approved for Academic Year: 2012-2013

COURSE DESCRIPTION

Students demonstrate theoretical Electro-Pneumatic knowledge. Students use simulation software to design task specific Electro-Pneumatic circuits then select hardware to implement their designs. Circuit applications mimic real life industrial situations. Adaptation and modification criteria cause students to be resourceful and to think outside the box. Curriculum includes exposure to Units of measure, types of directional control valves, solenoids, flow control, various actuators timers and ladder diagrams.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|----|--|
| 1 | Fabricate mechanical components and assemblies, and assemble electrical components and electronic assemblies by applying workshop skills and knowledge of basic shop practices in accordance with applicable codes and safety practices.(T,CP) |
| 3 | Select and use a variety of troubleshooting techniques and test equipment to assess electromechanical circuits, equipment, processes, systems, and subsystems.(T,A) |
| 4 | Modify, maintain, and repair electrical, electronic, and mechanical components, equipment, and systems to ensure that they function according to specifications.(T,CP) |
| 5 | Apply the principles of engineering, mathematics, and science to analyze and solve routine technical problems and to complete work related to electromechanical engineering.(T,A,CP) |
| 8 | Apply, install, test, and troubleshoot a variety of mechanical, electrical, and electronic control systems.(T,A,CP) |
| 12 | Select for purchase electromechanical equipment, components, and systems that fulfill the job requirements and functional specifications.(CP) |
| 14 | Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(CP) |

T: Teach **A:** Assess **CP:** Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|----|---|
| 2 | Respond to written, spoken or visual messages in a manner that ensures effective communication.(A) |
| 4 | Apply a systematic approach to solve problems.(T,CP) |
| 5 | Use a variety of thinking skills to anticipate and solve problems.(T,CP) |
| 6 | Locate, select, organize and document information using appropriate technology and information systems.(CP) |
| 7 | Analyze, evaluate and apply relevant information from a variety of sources.(CP) |
| 9 | Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. (CP) |
| 10 | Manage the use of time and other resources to complete projects.(CP) |
| 11 | Take responsibility for one's own actions, decisions and consequences.(CP) |

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Discuss the differences between pneumatics and hydraulics. Analyze manual hydraulic and electrohydraulic circuits.	<ul style="list-style-type: none"> 1 An understanding of the principles of hydraulic power transmission. 1 Understand and use ISO standard hydraulic diagrams. 1 Calculate actuator speeds, flow rates and forces within hydraulic circuits. 1 Familiarization with metering methods and different circuit configurations that impact force, speed and operation of hydraulic circuits. 1 Familiarization with software to simulate hydraulic and electrohydraulic circuitry.
2. Conduct independent and collaborative research into various electro-pneumatic devices. Analyze, design, simulate and construct electro-pneumatic circuits.	<ul style="list-style-type: none"> 1 Troubleshooting of electro pneumatic equipment and circuits. 1 Interpret, draw and build ISO ladder diagrams and circuits for electronically controlled pneumatics. 1 Know coordinated motion and control diagrams including sequence control.
3. Design, build and select componentry needed to satisfy all aspects of complex logic, including motion control and sequential electronic applications.	<ul style="list-style-type: none"> 1 Select and understand the use of sequence and /or pressure sensing sensors used to accomplish coordinated motion. 1 Construct electronic and physical circuitry to address power outage concerns using specific circuit design and components such as accumulators. 1 Understand the applications and implications of using delay on and delay off relays, electronic counters and different types of electronic sensors.

LEARNING RESOURCES

The books for this course are downloadable from FESTO Inc. The website is festodidactic.com. Look under courseware-pneumatics-textbooks or workbooks. The REQUIRED TEXT is #573030. The REQUIRED BOOK of EXERCISES is # 570693.

Important Note:

It is recommended that the student consult with the Professor before buying books, as the title and edition can change without notice. The teacher will announce the books that you will use in class. Some of these texts and workbooks are downloadable from FESTO.com

The professor will post various pertinent resources available online on Blackboard.

FESTO Hydraulic Video

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

For the duration of this course, you will be in a very much "hands-on" environment. You will be constructing, demonstrating and modifying numerous real life applications of fluid power circuitry. It is recommended that you wear appropriate clothing.

Safety eyewear is mandatory whenever you are in the lab...no exceptions. Non-compliance will result in expulsion from the lab.

The course is presented in a modular format. Emphasis is on the lab portion with the theory portion presented mainly through practical demonstrations, research projects and discussion. Peer discussion is encouraged.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
10% - Quizzes. 20% - Written theory tests. 30% - Hands on practical tests.	<ul style="list-style-type: none"> 1 Conduct independent and collaborative research into various electro-pneumatic devices. Analyze, design, simulate and construct electro-pneumatic circuits. - [CLR 2]

15% - Lab work.
05% - Research papers.
15% - Final Project.
05% - Participation.

- 1 Discuss the differences between pneumatics and hydraulics. Analyze manual hydraulic and electrohydraulic circuits. - [CLR 1]
- 1 Design, build and select componentry needed to satisfy all aspects of complex logic, including motion control and sequential electronic applications. - [CLR 3]
- 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
- 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
- 1 Apply a systematic approach to solve problems. - [EES 4]
- 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6]
- 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]
- 1 Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. - [EES 9]
- 1 Manage the use of time and other resources to complete projects. - [EES 10]
- 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2]

Note: All lab assignments are time sensitive. This means that all lab work must be completed and signed off by the professor by the due dates that are assigned via the CSI (Course Section Information). The lab signoff sheet is on BlackBoard (Bb). These dates are always the end of the last class **before** the corresponding test date. Tests should only be attempted by students who have completed the required (assigned) lab work. If a student does not have the required labs done for the test, penalties will be occur. See the Lab and Testing policy on Bb. for clarification.

- 1 Manage the use of time and other resources to complete projects. - [EES 10]
- 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

Safety Glasses
Closed-toed shoes

Refer to your CSI under Course Information on Blackboard for an updated Lab and Testing Policy

The following information is school/department-specific:**GENERAL CLAUSES - School of Advanced Technology**

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways

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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:**Email**

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Welding - Oxyacetylene and Arc

Construction Trades and Building Systems

Course Number: WEL9107	Contribution to Program: Vocational	Normative Hours: 45
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 1	Core/Elective: Core
Prepared by: Mark Bowen Coordinator		Approval Date: 09/07/2012
Co-Requisites N/A		Approved by: Christopher Hahn Chair, Construction Trades and Building Systems
Pre-Requisites N/A		Approved for Academic Year: 2012-2013

COURSE DESCRIPTION

This is a hands-on course in oxyacetylene, shield metal arc (SMAW), gas metal arc (MIG) and gas tungsten arc (TIG) welding. Students learn the basic setup and safe operation of all of these welding processes. Independent study and project-based learning are emphasized.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|----|---|
| 1 | Fabricate mechanical components and assemblies, and assemble electrical components and electronic assemblies by applying workshop skills and knowledge of basic shop practices in accordance with applicable codes and safety practices.(T,A) |
| 14 | Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(T,A) |

T: Teach A: Assess CP: Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

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

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Practice safe operations and health regulations	<ul style="list-style-type: none"> 1 use proper P.P.E. (safety) equipment 1 demonstrate proper set-up and use of O.A.W. equipment 1 demonstrate proper set-up and use of O.A.C. equipment 1 demonstrate proper set-up and use of S.M.A.W. equipment
2. Choose which procedure is to be used to join metal - fusion, brazing.	<ul style="list-style-type: none"> 1 fuse (weld) various joint designs 1 fuse (weld) different thicknesses 1 braze (brass) "lap" and "tee" joints
3. Operate an oxyacetylene cutting torch.	<ul style="list-style-type: none"> 1 demonstrate his/her ability to remove metal
4. Understand basic electricity associated with welding.	<ul style="list-style-type: none"> 1 understand the principles and units of electricity 1 understand the function and difference between direct and alternating current
5. Operate welding equipment.	<ul style="list-style-type: none"> 1 identify the various components of S.M.A.W. equipment.

	<ul style="list-style-type: none"> 1 select the proper current and polarity to perform a welding task
6. Select the proper electrodes to perform a welding task.	<ul style="list-style-type: none"> 1 strike and maintain an arc 1 complete a minimum of four "tee" and "lap" joints using a variety of electrodes and sizes 1 perform a fillet weld in flat/horizontal position using the S.M.A.W. process
7. Practice safe operation and health regulations.	<ul style="list-style-type: none"> 1 use proper personal equipment 1 operate G.M.A.W. and G.T.A.W. equipment
8. Operate varieties of welding equipment.	<ul style="list-style-type: none"> 1 demonstrate proper set-up and use of G.M.A.W. equipment 1 demonstrate proper set-up and use of G.T.A.W. equipment 1 select proper process to perform a welding task 1 select different power sources along with their auxiliary equipment

LEARNING RESOURCES

Hand outs
Computer links
Demonstrations

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

- 1 attending lectures
- 1 note taking
- 1 reading assignment
- 1 completion of practical projects
- 1 demonstrations

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
Practical Projects 65%	<ul style="list-style-type: none"> 1 Operate welding equipment. - [CLR 5] 1 Practice safe operation and health regulations. - [CLR 7] 1 Operate varieties of welding equipment. - [CLR 8] 1 Practice safe operations and health regulations - [CLR 1] 1 Choose which procedure is to be used to join metal - fusion, brazing. - [CLR 2] 1 Operate an oxyacetylene cutting torch. - [CLR 3] 1 Understand basic electricity associated with welding. - [CLR 4] 1 Select the proper electrodes to perform a welding task. - [CLR 6] 1 Manage the use of time and other resources to complete projects. - [EES 10]
Test 25%	<ul style="list-style-type: none"> 1 Practice safe operations and health regulations - [CLR 1] 1 Practice safe operation and health regulations. - [CLR 7] 1 Operate varieties of welding equipment. - [CLR 8] 1 Understand basic electricity associated with welding. - [CLR 4]
Participation / Ethics 10%	<ul style="list-style-type: none"> 1 Manage the use of time and other resources to complete projects. - [EES 10]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

Final Grade	Mark Equivalent	Numeric Value	Final Grade	Mark Equivalent	Numeric Value
-------------	-----------------	---------------	-------------	-----------------	---------------

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

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Challenge Exam
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

safety boots or shoes (steel toed) , long pants (no cuffs) and safety glasses must be worn in the shop/lab environment to participate in this class. Perfect attendance is strongly recommended.

The following information is school/department-specific:

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Computer-Aided Design and Computer Numerical Control

Mechanical and Transportation Technology

Course Number: CAD9101	Contribution to Program: Vocational	Normative Hours: 60
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 3	Core/Elective: Core
Prepared by: Stephen Ryan Coordinator		Approval Date: 21/06/2013
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical and Transportation Technology
Pre-Requisites MAC9200		Approved for Academic Year: 2013-2014

COURSE DESCRIPTION

Students use Computer-Aided Design and Computer Numerical Control equipment to produce prototype parts. Students produce drawings on a CAD system and program a CNC machining centre to produce the desired design. Innovative design is encouraged.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- 1 Fabricate mechanical components and assemblies, and assemble electrical components and electronic assemblies by applying workshop skills and knowledge of basic shop practices in accordance with applicable codes and safety practices.(T,A,CP)
- 2 Interpret and produce electrical, electronic, and mechanical drawings and other related documents and graphics to appropriate engineering standards.(T,A,CP)
- 5 Apply the principles of engineering, mathematics, and science to analyze and solve routine technical problems and to complete work related to electromechanical engineering.(T,A)
- 6 Assist in the specification of manufacturing materials, processes, and operations to support the design and production of mechanical components.(T,A,CP)
- 9 Install and troubleshoot basic computer hardware and programming to support the electromechanical engineering environment.(T,A)

T: Teach A: Assess CP: Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- 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)
- 2 Respond to written, spoken or visual messages in a manner that ensures effective communication.(T)
- 4 Apply a systematic approach to solve problems.(T,A)
- 5 Use a variety of thinking skills to anticipate and solve problems.(A)
- 9 Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. (A)
- 10 Manage the use of time and other resources to complete projects.(T,A,CP)
- 11 Take responsibility for one's own actions, decisions and consequences.(T,CP)

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
--	--------------------------------------

1. Produce working drawings, using AutoCad software, of a mechanical or electrical nature.	<ul style="list-style-type: none"> 1 Set-up drawing protocols. 1 Display, snap and erase 1 Units and entity commands 1 Object selection and editing
2. Design a project to be fabricated using a CNC machine.	<ul style="list-style-type: none"> 1 Produce a complete set of drawings and supporting documentation for a self-designed part for manufacture on CNC equipment.
3. Program a CNC machine from completed drawings and produce the product to specifications.	<ul style="list-style-type: none"> 1 Use and be familiar with various G and M function codes to control a CNC machining center. 1 Familiarization with, and awareness of the differences between, "Absolute & Incremental" programming methods. 1 Preparation of material, and selection of tooling, used for manufacture of project.

LEARNING RESOURCES

Teacher supplied CNC manual on BlackBoard (Bb)

Other AutoCAD reference books may be used but ask teacher if suitable before purchasing.

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

As this course is delivered in a "Hybrid" method some of the learning you will experience will be in class as well as electronically via Email and Bb (BlackBoard). Classroom portions of instruction will feature demonstrations using AutoCAD software and CNC programming examples. Careful "step by step work-through" of CNC Tutorial will provide the necessary skills needed to complete the project. Familiarization with and operation of the CNC machining center will occur in the CNC lab area including "hands on" training on the machining center. Peer discussion and collaborative learning is encouraged.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
Drawings: Ten Drawings 3% each for 30%	<ul style="list-style-type: none"> 1 Produce working drawings, using AutoCad software, of a mechanical or electrical nature. - [CLR 1] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2] 1 Manage the use of time and other resources to complete projects. - [EES 10]
CNC Project Project Drawings incl. supporting docs. 10%. Project Program 5%. Project 10%.	<ul style="list-style-type: none"> 1 Design a project to be fabricated using a CNC machine. - [CLR 2] 1 Produce working drawings, using AutoCad software, of a mechanical or electrical nature. - [CLR 1] 1 Program a CNC machine from completed drawings and produce the product to specifications. - [CLR 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11] 1 Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. - [EES 9]
Tests & Quizzes: One Practical drawing test 20% .	<ul style="list-style-type: none"> 1 Produce working drawings, using AutoCad software, of a mechanical or electrical nature. - [CLR 1]

<p>CAD 5%, Safety 5%, Basic CNC operation 5%.</p>	<ul style="list-style-type: none"> 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11] 1 Apply a systematic approach to solve problems. - [EES 4]
<p>LABS: Completed lab piece: Square Triangle and Happy Face 10%</p>	<ul style="list-style-type: none"> 1 Program a CNC machine from completed drawings and produce the product to specifications. - [CLR 3] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
<p>Notes Regarding Evaluation:</p> <p>There is sufficient time allotted to complete all requirements for this course provided that you use your time wisely. All drawings must be submitted for grading by the appropriate time/date via Algonquin College's email system. All student submissions are time sensitive, therefore, the professor will use the College's email system only as it will validate all time/date information. It is the students responsibility to know the due dates. They are posted on Bb in the "Weekly Planner". Late or untimely submissions will be graded ZERO. Students are <u>strongly advised</u> to keep back-up files of emails and all submissions.</p>	

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

Safety Glasses
Closed-toed shoes

Refer to the CSI under Course Information on Blackboard for an updated Lab and Testing Policy

Respect for Confidentiality

Students are required to respect the confidentiality of employer, client and/or patient information, interactions, and practices that occur either on AlgonquinCollege 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.

The following information is school/department-specific:**GENERAL CLAUSES - School of Advanced Technology**

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices , with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology' s Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology' s Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

Students are required to respect the confidentiality of employer, client and/or patient information, interactions, and practices that occur either on AlgonquinCollege 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

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 very 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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Digital Logic Analysis

Mechanical and Transportation Technology

Course Number: ELN8303	Contribution to Program: Vocational	Normative Hours: 135
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 3	Core/Elective: Core
Prepared by: Stephen Ryan Coordinator		Approval Date: 21/06/2013
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical and Transportation Technology
Pre-Requisites ELN9192		Approved for Academic Year: 2013-2014

COURSE DESCRIPTION

The theory of digital logic, including number systems is covered. Topics of study include logic gates and Boolean algebra, the introduction to PLD's, sequential logic, combinational logic, flip-flops, counters and shift registers. Using lab experiments, students learn to design and apply modern digital circuitry.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|----|--|
| 2 | Interpret and produce electrical, electronic, and mechanical drawings and other related documents and graphics to appropriate engineering standards.(T,A,CP) |
| 3 | Select and use a variety of troubleshooting techniques and test equipment to assess electromechanical circuits, equipment, processes, systems, and subsystems.(T,A,CP) |
| 4 | Modify, maintain, and repair electrical, electronic, and mechanical components, equipment, and systems to ensure that they function according to specifications.(T,A,CP) |
| 5 | Apply the principles of engineering, mathematics, and science to analyze and solve routine technical problems and to complete work related to electromechanical engineering.(T,A,CP) |
| 7 | Analyze, build, and troubleshoot logic and digital circuits, passive AC and DC circuits, and active circuits.(T,A,CP) |
| 14 | Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(T,A,CP) |
| 15 | Develop personal and professional strategies and plans to improve job performance and work relationships with clients, coworkers, and supervisors.(A) |

T: Teach **A:** Assess **CP:** Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|----|---|
| 2 | Respond to written, spoken or visual messages in a manner that ensures effective communication.(T,A,CP) |
| 4 | Apply a systematic approach to solve problems.(T,A,CP) |
| 6 | Locate, select, organize and document information using appropriate technology and information systems.(T,A,CP) |
| 7 | Analyze, evaluate and apply relevant information from a variety of sources.(T,A,CP) |
| 10 | Manage the use of time and other resources to complete projects.(T,A) |
| 11 | Take responsibility for one's own actions, decisions and consequences.(T,A,CP) |

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Understand Basic Digital Concepts	<ul style="list-style-type: none"> 1 Explain the basic difference between digital and analog qualities and their respective voltage levels 1 Describe various parameters of a pulse waveform such as: rise time, pulse width, frequency, period and duty cycle 1 Explain the basic logic operations of NOT, AND and OR 1 Describe the logic functions of the comparator, adder, code converter, encoder, decoder, multiplexer, demultiplexer, counter and register 1 Identify fixed-function digital integrated circuits according to their complexity and the type of circuit packaging
2. Understand and apply the operations, codes and conversions between the various number systems	<ul style="list-style-type: none"> 1 Count in and apply arithmetic operations to the various number systems 1 Convert between the various numbering systems 1 Interpret the American Standard Code for Information Exchange (ASCII) 1 Use binary numbers and codes in a system application
3. Design, test and program a PLD (Programmable Logic Device) to implement logic functions	<ul style="list-style-type: none"> 1 Discuss PLD software 1 Enter a logic design using PLD software then simulate the design and download it to a target device
4. Describe the operation of digital logic gates	<ul style="list-style-type: none"> 1 Describe the operation of the following logic gates: the inverter, the AND, the OR, the NAND, the NOR, the XOR and the XNOR and express using Boolean Algebra 1 Recognize and use both the distinctive shape logic symbols and the rectangular outline logic gate symbols of ANSI/IEEE Standard 91-1984 1 Construct timing diagrams showing the proper timing relationships of inputs and outputs for various logic gates 1 Explain and make basic conversions between the major IC technologies CMOS and TTL 1 Define propagation delay, power dissipation, speed-power product and fan-out in relation to logic gates 1 List specific fixed function integrated circuit devices that contain the various logic gates 1 Troubleshoot logic gates for opens and shorts by using the multimeter and oscilloscope 1 Describe the basic concepts of programmable logic
5. Solve Boolean equations to find the minimum form	<ul style="list-style-type: none"> 1 Apply the basic laws and rules of Boolean Algebra including DeMorgan's theorem 1 Convert any Boolean expression into a sum-of-products (SOP) form and a product-of-sums (POS) form 1 Use a Karnaugh map to simplify Boolean and truth table expressions and be able to explain and work with 'don't care' states 1 Describe how a PAL (Programmable Array Logic) device works and explain how the part number defines its description
6. Define and create circuits using combinational logic	<ul style="list-style-type: none"> 1 Analyze basic combinational circuits such as AND-OR, AND-OR-Invert, exclusive OR, exclusive NOR, and other general combinational networks and implement in sum-of-products (SOP) and product-of-sums (POS) expressions 1 Develop the following for any combinational logic circuit: a Boolean expression, a truth table and a Karnaugh map 1 Design a combinational logic circuit for a given Boolean output

	<p>expression using various gates and be able to implement that given Boolean output expression using just NAND gates</p> <ul style="list-style-type: none"> 1 Troubleshoot logic circuits by using signal tracing and waveform analysis 1 Describe a GAL and how it differs from a PAL
7. Describe the operation and application of binary and BCD counters, shift registers and other sequential logic circuits	<ul style="list-style-type: none"> 1 Distinguish between half-adders and full-adders 1 Use full-adders to implement multi-bit parallel binary adders 1 Explain the difference between ripple carry and look-ahead carry parallel adders 1 Use the magnitude comparator to determine the relationship between two binary numbers and use cascaded comparators to handle the comparison of larger numbers 1 Implement a basic binary, a BCD to 7-segment and a decimal to BCD decoder 1 Convert from binary to Gray code and Gray code to binary using logic devices 1 Apply multiplexers in data selection, multiplexed displays, logic functions generations and simple communication systems 1 Use decoders as multiplexers 1 Explain the meaning of parity and use parity generators and checkers to detect bit errors in digital systems 1 Use parity generators and checkers to detect bit errors in digital systems 1 Implement a simple data communications system 1 Identify glitches, common bugs in digital systems 1 Describe, basically, how SPLDs are programmed
8. Understand and apply the different flip flops and their related devices	<ul style="list-style-type: none"> 1 Use logic gates to construct basic latches 1 Explain the difference between an S-R latch and a D latch 1 Explain how S-R, D and JK flip flops differ 1 Explain how edge-triggered and master-slave flip flops differ 1 Recognize the difference between a latch and a flip flop 1 Understand the significance of propagation delays, set-up time, hold time, maximum operating frequency, minimum operating frequency, clock pulse widths and power dissipation in the application of flip-flops 1 Apply flip flops in basic applications 1 Analyse circuits for race conditions and the occurrence of glitches 1 Explain how retriggerable and non-retriggerable one-shots differ 1 Connect a 555 timer to operate as either an astable multivibrator or a one-shot 1 Approach the debugging of a new design 1 Troubleshoot basic flip-flop and one-shot circuits 1 Describe the OLMC's in the GAL22V10 and the GAL16V8 1 Explain the difference between the registered mode and the combinational mode 1 Apply one-shots in a system application
9. Analyse and design various counters	<ul style="list-style-type: none"> 1 Describe the difference between an asynchronous and a synchronous counter 1 Analyse counter timing diagrams 1 Analyse counter circuits

	<ul style="list-style-type: none"> 1 Explain how propagation delays affect the operation of a counter 1 Identify and modify the modulus of a counter 1 Recognize the difference between a 4-bit binary counter and a decade counter 1 Use an up/down counter to generate forward and reverse binary sequences 1 Determine the sequence of a counter 1 Use IC counters in various applications 1 Design a counter that will have any specified sequence of states 1 Use cascaded counters to achieve a higher modulus 1 Use logic gates to decode any given state of a counter 1 Eliminate glitches in counter decoding 1 Explain how a digital clock operates 1 Troubleshoot counters for various types of faults 1 Interpret counter logic symbols that use dependency notation 1 Discuss mode selection in an SPLD
10. Recognize, analyse and design a number of shift registers	<ul style="list-style-type: none"> 1 Explain how serial in/serial out, serial in/parallel out, parallel in/serial out and parallel in/parallel out shift registers operate 1 Describe how a bidirectional shift register operates 1 Determine the sequence of a ring and a twisted-ring (Johnson) counter using a shift register 1 Use a shift register as a time delay device 1 Implement a basic shift register controlled keyboard encoder 1 Troubleshoot digital systems by "exercising" the system using a known test pattern 1 Interpret ANSI/IEEE Standard 91-1984 shift register symbols with dependency notation 1 Describe a basic CPLD

LEARNING RESOURCES

Text: Digital Fundamentals with PLD Programming, Thomas L. Floyd, Prentice-Hall
ISBN: 0-13-170188-6

Workbook: Experiments in Digital Fundamentals, 10e, David Buchla, Prentice-Hall
ISBN: 0-13-712965-3

Package that includes both the Text and Lab books:
ISBN: 0-13-704863-7

Check Blackboard for External Links and Course Documents to access additional resources

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

Theory: Although the course is self-directed, lectures may be conducted to help explain course material. Students write tests, quizzes and lab reports

Practical: Experiments are conducted in a laboratory environment

Students complete related experiments at a workstation with professor guidance. Experiments for each unit must be completed and any accompanying lab reports must be submitted before a test is handed out

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:

This activity validates the following Course Learning Requirements and/or Essential Employability Skills:

<div>Quizzes</div> <table><tr><td>1 -- CLR</td><td>1 & 2</td><td>Chapters 1, 2</td><td>3%</td></tr><tr><td>2 -- CLR</td><td>3, 4, 5</td><td>Chapters 7, 3, 4</td><td>3%</td></tr><tr><td>3 -- CLR</td><td>6 & 7</td><td>Chapter 5, 8</td><td>3%</td></tr><tr><td>4 -- CLR</td><td>8</td><td>Chapter 9, 10</td><td>3%</td></tr><tr><td>5 -- CLR</td><td>9, 10</td><td>Chapters 11, 12</td><td>3%</td></tr><tr><td colspan="3">Total Unit Tests</td><td>15%</td></tr></table> <div><div>Edit</div><div>Delete</div></div>	1 -- CLR	1 & 2	Chapters 1, 2	3%	2 -- CLR	3, 4, 5	Chapters 7, 3, 4	3%	3 -- CLR	6 & 7	Chapter 5, 8	3%	4 -- CLR	8	Chapter 9, 10	3%	5 -- CLR	9, 10	Chapters 11, 12	3%	Total Unit Tests			15%	<div><div>1</div>Solve Boolean equations to find the minimum form - [CLR 5]</div> <div><div>1</div>Recognize, analyse and design a number of shift registers - [CLR 10]</div> <div><div>1</div>Analyse and design various counters - [CLR 9]</div> <div><div>1</div>Design, test and program a PLD (Programmable Logic Device) to implement logic functions - [CLR 3]</div> <div><div>1</div>Understand and apply the operations, codes and conversions between the various number systems - [CLR 2]</div> <div><div>1</div>Describe the operation of digital logic gates - [CLR 4]</div> <div><div>1</div>Understand Basic Digital Concepts - [CLR 1]</div> <div><div>1</div>Define and create circuits using combinational logic - [CLR 6]</div> <div><div>1</div>Understand and apply the different flip flops and their related devices - [CLR 8]</div> <div><div>1</div>Describe the operation and application of binary and BCD counters, shift registers and other sequential logic circuits - [CLR 7]</div> <div><div>1</div>Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2]</div> <div><div>1</div>Apply a systematic approach to solve problems. - [EES 4]</div> <div><div>1</div>Locate, select, organize and document information using appropriate technology and information systems. - [EES 6]</div> <div><div>1</div>Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]</div> <div><div>1</div>Manage the use of time and other resources to complete projects. - [EES 10]</div> <div><div>1</div>Take responsibility for one's own actions, decisions and consequences. - [EES 11]</div>
1 -- CLR	1 & 2	Chapters 1, 2	3%																						
2 -- CLR	3, 4, 5	Chapters 7, 3, 4	3%																						
3 -- CLR	6 & 7	Chapter 5, 8	3%																						
4 -- CLR	8	Chapter 9, 10	3%																						
5 -- CLR	9, 10	Chapters 11, 12	3%																						
Total Unit Tests			15%																						
<div>Unit Tests</div> <table><tr><td>1 -- CLR</td><td>1 & 2</td><td>Chapters 1,2</td><td>7.5%</td></tr><tr><td>2 -- CLR</td><td>3, 4, 5</td><td>Chapters 7,3,4</td><td>7.5%</td></tr><tr><td>3 -- CLR</td><td>6 & 7</td><td>Chapter 5, 8</td><td>7.5%</td></tr><tr><td>4 -- CLR</td><td>8</td><td>Chapter 9,10</td><td>7.5%</td></tr><tr><td>5 -- CLR</td><td>9,10</td><td>Chapters 11,12</td><td>7.5%</td></tr><tr><td colspan="3">Total Unit Tests</td><td>37.5%</td></tr></table>	1 -- CLR	1 & 2	Chapters 1,2	7.5%	2 -- CLR	3, 4, 5	Chapters 7,3,4	7.5%	3 -- CLR	6 & 7	Chapter 5, 8	7.5%	4 -- CLR	8	Chapter 9,10	7.5%	5 -- CLR	9,10	Chapters 11,12	7.5%	Total Unit Tests			37.5%	<div><div>1</div>Recognize, analyse and design a number of shift registers - [CLR 10]</div> <div><div>1</div>Design, test and program a PLD (Programmable Logic Device) to implement logic functions - [CLR 3]</div> <div><div>1</div>Understand Basic Digital Concepts - [CLR 1]</div> <div><div>1</div>Understand and apply the operations, codes and conversions between the various number systems - [CLR 2]</div> <div><div>1</div>Describe the operation of digital logic gates - [CLR 4]</div> <div><div>1</div>Solve Boolean equations to find the minimum form - [CLR 5]</div> <div><div>1</div>Analyse and design various counters - [CLR 9]</div> <div><div>1</div>Describe the operation and application of binary and BCD counters, shift registers and other sequential logic circuits - [CLR 7]</div> <div><div>1</div>Define and create circuits using combinational logic - [CLR 6]</div> <div><div>1</div>Understand and apply the different flip flops and their related devices - [CLR 8]</div> <div><div>1</div>Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2]</div> <div><div>1</div>Apply a systematic approach to solve problems. - [EES 4]</div> <div><div>1</div>Manage the use of time and other resources to complete projects. - [EES 10]</div> <div><div>1</div>Take responsibility for one's own actions, decisions and consequences. - [EES 11]</div>
1 -- CLR	1 & 2	Chapters 1,2	7.5%																						
2 -- CLR	3, 4, 5	Chapters 7,3,4	7.5%																						
3 -- CLR	6 & 7	Chapter 5, 8	7.5%																						
4 -- CLR	8	Chapter 9,10	7.5%																						
5 -- CLR	9,10	Chapters 11,12	7.5%																						
Total Unit Tests			37.5%																						
<div>Lab Tests</div>	<div><div>1</div>Analyse and design various counters - [CLR 9]</div>																								

1 -- CLR	1 & 2	Chapters 1,2	7.5%
2 -- CLR	3,4,5	Chapters 7,3,4	7.5%
3 -- CLR	6 & 7	Chapter 5, 8	7.5%
4 -- CLR	8	Chapter 9,10	7.5%
5 -- CLR	9,10	Chapters 11,12	7.5%

Total Unit Tests 37.5%

Edit Delete

- 1 Design, test and program a PLD (Programmable Logic Device) to implement logic functions - [CLR 3]
- 1 Understand and apply the operations, codes and conversions between the various number systems - [CLR 2]
- 1 Describe the operation of digital logic gates - [CLR 4]
- 1 Recognize, analyse and design a number of shift registers - [CLR 10]
- 1 Understand Basic Digital Concepts - [CLR 1]
- 1 Define and create circuits using combinational logic - [CLR 6]
- 1 Understand and apply the different flip flops and their related devices - [CLR 8]
- 1 Describe the operation and application of binary and BCD counters, shift registers and other sequential logic circuits - [CLR 7]
- 1 Solve Boolean equations to find the minimum form - [CLR 5]
- 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2]
- 1 Apply a systematic approach to solve problems. - [EES 4]
- 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]
- 1 Manage the use of time and other resources to complete projects. - [EES 10]
- 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]

Lab Sign Off Sheets 10%

- 1 Recognize, analyse and design a number of shift registers - [CLR 10]
- 1 Design, test and program a PLD (Programmable Logic Device) to implement logic functions - [CLR 3]
- 1 Understand Basic Digital Concepts - [CLR 1]
- 1 Understand and apply the operations, codes and conversions between the various number systems - [CLR 2]
- 1 Describe the operation of digital logic gates - [CLR 4]
- 1 Solve Boolean equations to find the minimum form - [CLR 5]
- 1 Analyse and design various counters - [CLR 9]
- 1 Describe the operation and application of binary and BCD counters, shift registers and other sequential logic circuits - [CLR 7]
- 1 Define and create circuits using combinational logic - [CLR 6]
- 1 Understand and apply the different flip flops and their related devices - [CLR 8]
- 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2]
- 1 Apply a systematic approach to solve problems. - [EES 4]
- 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6]
- 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]
- 1 Manage the use of time and other resources to complete projects. - [EES 10]
- 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

Safety Glasses

Closed-toed shoes

Electronics toolkit consisting of cutters, wire strippers, needlenose pliers, protoboard, small electronic screwdriver kit, 2 oscilloscope leads, 2 BNC to alligator leads and 3 sets of meter leads.

Refer to your CSI under Course Information on Blackboard for the updated Lab and Testing Policy.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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

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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy

classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Microcontrollers

Mechanical and Transportation Technology

Course Number: ELN9203	Contribution to Program: Vocational	Normative Hours: 60
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 3	Core/Elective: Core
Prepared by: Stephen Ryan Coordinator		Approval Date: 21/06/2013
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical and Transportation Technology
Pre-Requisites ELN9192		Approved for Academic Year: 2013-2014

COURSE DESCRIPTION

The microcontroller is one of the most comprehensive and versatile self-contained electronic control components in existence. Working as a tiny dedicated computer, this chip is perfect for applications requiring mobility. As a result, an understanding of the microcontroller is vital to any study of robotics. A PIC microcontroller and assembly language are used to expose the student to various fundamental programming and interfacing techniques. Analytical and troubleshooting skills are further developed through experiments with the PIC and its associated components.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|---|---|
| 2 | Interpret and produce electrical, electronic, and mechanical drawings and other related documents and graphics to appropriate engineering standards.(T,A,CP) |
| 3 | Select and use a variety of troubleshooting techniques and test equipment to assess electromechanical circuits, equipment, processes, systems, and subsystems.(T) |
| 9 | Install and troubleshoot basic computer hardware and programming to support the electromechanical engineering environment. (T,A,CP) |

T: Teach A: Assess CP: Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|---|---|
| 4 | Apply a systematic approach to solve problems.(T,A,CP) |
| 7 | Analyze, evaluate and apply relevant information from a variety of sources.(T,A,CP) |
| 8 | Show respect for diverse opinions, values, belief systems and contributions of others. (T,A,CP) |

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Understand the basics for dealing with microcontrollers in terms of definition, flowcharting, troubleshooting, and basic numbering systems.	<ul style="list-style-type: none"> 1 Explain microprocessors and microcontrollers and the difference between the two 1 Create flowcharts from a worded description or from a program using all of the appropriate boxes including terminal, decision, operation, connector and subroutine 1 Explain the different numbering systems including binary, hexadecimal, and decimal; explain how to convert back and forth between all of them. Explain assembly language vs. machine code and the ASCII code.

	<ul style="list-style-type: none"> 1 Explain the ALU and processor control 1 Give an overview of the microcontroller and demonstrate programming through a given simulation exercise 1 Properly document your flowcharting and troubleshooting procedures 1 Demonstrate how to calculate the 1s and 2s complement for binary, hex and decimal number systems
2. Understand and explain the basics of the PIC microcontroller in terms of real circuits, including labels, equates, logic, and timing	<ul style="list-style-type: none"> 1 Create a basic PIC program in Assembly language and transfer to a working circuit 1 Create, edit, analyze, assemble, simulate, download and test a PIC program 1 Demonstrate how logic is processed with a PIC microcontroller including AND, OR and XOR logic 1 Demonstrate the troubleshooting process and explain how to set up a circuit for easier troubleshooting. Employ all of the hardware troubleshooting setup techniques on all circuits: i.e. labelling pinouts, neat and consistent wiring, measuring power and ground at all points, and testing all hardware I/O. 1 Organize programs to emulate a C type format using the proper order of program components such as equates, includes, initializations, subroutines and the main section. 1 Explain and demonstrate the CALL and GOTO instructions, subroutines, and interrupts; also explain and demonstrate the three return instructions RETFIE, RETLW and RETURN, and when to use each. 1 Explain how to use and calculate values for the STATUS, INTCON and OPTION registers
3. Understand and explain how a PIC can be used to drive various types of motors.	<ul style="list-style-type: none"> 1 Explain and demonstrate how to drive a basic DC motor 1 Explain and demonstrate how to drive a DC motor using PWM control; including defining duty cycle and how it is calculated 1 Explain and demonstrate how to program and run a stepper motor in wave, half and full stepping as well as reversed rotation 1 Explain and demonstrate how to drive a servo motor and all the programming steps required 1 Troubleshoot and solve issues with all of the motor types
4. Demonstrate the use of 7-segment displays and ICP in a PIC circuit.	<ul style="list-style-type: none"> 1 Explain and demonstrate how to wire and run a program using a 7 segment display, and explain the 7 segment display in terms of common cathode, common anode, active high and active low 1 Explain and demonstrate look up tables for displays and how they work 1 Explain and demonstrate the use of ICP (in circuit programming).

LEARNING RESOURCES

MPLab software (Microchip)

ET-PGM PIC USB PIC programmer (available in bookstore)
Electronics toolkit (Student must purchase)

PIC 16F877A data sheet.
Other data sheets as needed

Online resources and searches

Other materials as instructed by Professor

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

A large portion of this course is achieved by hands on practical experience. Some peer teaching and collaborated learning may be involved. Research on the internet is required. A complete list of required labs is available on blackboard.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
<p>Tests86%</p> <p>4 Tests, 1 per CLR @ 21.5% each</p>	<ul style="list-style-type: none"> 1 Understand and explain the basics of the PIC microcontroller in terms of real circuits, including labels, equates, logic, and timing - [CLR 2] 1 Understand the basics for dealing with microcontrollers in terms of definition, flowcharting, troubleshooting, and basic numbering systems. - [CLR 1] 1 Understand and explain how a PIC can be used to drive various types of motors. - [CLR 3] 1 Demonstrate the use of 7-segment displays and ICP in a PIC circuit. - [CLR 4] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8]
<p>Quizzes 4%</p> <p>4 Quizzes, 1 per CLR @ 1% each</p>	<ul style="list-style-type: none"> 1 Demonstrate the use of 7-segment displays and ICP in a PIC circuit. - [CLR 4] 1 Understand the basics for dealing with microcontrollers in terms of definition, flowcharting, troubleshooting, and basic numbering systems. - [CLR 1] 1 Understand and explain how a PIC can be used to drive various types of motors. - [CLR 3] 1 Understand and explain the basics of the PIC microcontroller in terms of real circuits, including labels, equates, logic, and timing - [CLR 2] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8]
<p>Labs 10%</p> <p>Lab Sign Off Sheet, encompassing all labs</p>	<ul style="list-style-type: none"> 1 Understand the basics for dealing with microcontrollers in terms of definition, flowcharting, troubleshooting, and basic numbering systems. - [CLR 1] 1 Understand and explain how a PIC can be used to drive various types of motors. - [CLR 3] 1 Understand and explain the basics of the PIC microcontroller in terms of real circuits, including labels, equates, logic, and timing - [CLR 2] 1 Demonstrate the use of 7-segment displays and ICP in a PIC circuit. - [CLR 4] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

Safety Glasses

Closed-toed shoes

Electronics toolkit consisting of cutters, wire strippers, needlenose pliers, protoboard, small electronic screwdriver kit, 2 oscilloscope leads, 2 BNC to alligator leads and 3 sets of metre leads.

Refer to your CSI under Course Information on Blackboard for the updated Lab and Testing Policy.

If you are a student with a disability please identify your needs to the professor and/or the Centre for Students with Disabilities (CSD) so that support services can be arranged for you. You can do this by making an appointment at the CSD, Room C142, Ottawa, 727-4723, Ext 7683 or arranging a personal interview with the professor to discuss your needs.

Respect for Confidentiality

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.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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

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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25

<http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32

<http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Microcontroller Interfacing and Programming

Mechanical and Transportation Technology

Course Number: ELN9204	Contribution to Program: Vocational	Normative Hours: 75
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 4	Core/Elective: Core
Prepared by: Stephen Ryan Coordinator		Approval Date: 21/06/2013
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical and Transportation Technology
Pre-Requisites ELN8303 and ELN9203		Approved for Academic Year: 2013-2014

COURSE DESCRIPTION

Interfacing the PIC microcontroller to an assortment of electronic components demonstrates many of the various ways these components can be used in industry. Topics include Temperature Sensors, EEPROM Programming, Analog to Digital Conversion, Clocking Data in and out, Interfacing Displays, Real-Time Interfacing and Programming the PIC using C. Different methods of circuit analysis and troubleshooting skills are examined through experimentation with the PIC and its associated components.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|----|--|
| 2 | Interpret and produce electrical, electronic, and mechanical drawings and other related documents and graphics to appropriate engineering standards.(T,A,CP) |
| 3 | Select and use a variety of troubleshooting techniques and test equipment to assess electromechanical circuits, equipment, processes, systems, and subsystems.(T,A) |
| 4 | Modify, maintain, and repair electrical, electronic, and mechanical components, equipment, and systems to ensure that they function according to specifications.(T,A) |
| 5 | Apply the principles of engineering, mathematics, and science to analyze and solve routine technical problems and to complete work related to electromechanical engineering.(T,A,CP) |
| 7 | Analyze, build, and troubleshoot logic and digital circuits, passive AC and DC circuits, and active circuits.(T,A,CP) |
| 9 | Install and troubleshoot basic computer hardware and programming to support the electromechanical engineering environment.(T,A,CP) |
| 14 | Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(T,A,CP) |
| 15 | Develop personal and professional strategies and plans to improve job performance and work relationships with clients, coworkers, and supervisors.(T,A,CP) |

T: Teach **A:** Assess **CP:** Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|----|--|
| 3 | Execute mathematical operations accurately.(T,A,CP) |
| 4 | Apply a systematic approach to solve problems.(T,A,CP) |
| 5 | Use a variety of thinking skills to anticipate and solve problems.(T,A,CP) |
| 9 | Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. (T,A) |
| 10 | Manage the use of time and other resources to complete projects.(T,A,CP) |
| 11 | Take responsibility for one's own actions, decisions and consequences.(T,A,CP) |

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Define basic concepts	1 <ul style="list-style-type: none"> ○ Define the term "computer" and discuss hardware and software components ○ Discuss the hierarchical organization of data ○ Understand the program development process ○ Distinguish between syntax and logical errors ○ Describe the process that C and Assembly Language perform to create executables from source statements ○ Design and write simple programming applications in C
2. Discuss the structure of a C program	1 <ul style="list-style-type: none"> ○ Discuss the basic structure of a C program and the purpose of the <i>main()</i> function ○ Define constants and variables ○ Declare and assign data to integer and floating point data types ○ Declare and assign data to character and string data types ○ Code standard input and output operations ○ Write programs to accept input from keyboard
3. Write modular programs	1 <ul style="list-style-type: none"> ○ Discuss the concepts and benefits of modular structured programming ○ Divide a program into a series of self-contained modules ○ Explain the purpose of logic structures - sequence, selection and iteration ○ Explain why programming guidelines are necessary ○ Write C programs using top-down design and modular structured programming techniques
4. Explain string functions and loops	1 <ul style="list-style-type: none"> ○ Manipulate string data using various string functions ○ Understand the concepts of iteration and loop processing ○ Use relational and logic operators to write conditional statements ○ set up loops using the WHILE, DO-WHILE and FOR statements ○ format printer output and accumulate report totals ○ Code nested loops
5. Control program flow using branching	1 <ul style="list-style-type: none"> ○ Distinguish between conditional and unconditional branching ○ Use IF and ELSE/IF statements to select alternate processing paths ○ Code nested decisions using the IF and IF/ELSE statements ○ Use the SWITCH and BREAK statements to code multipath decisions ○ Understand why programmers avoid the GOTO statement
6. Store data into sorted arrays	1 <ul style="list-style-type: none"> ○ Understand the purpose of arrays and the use of subscripts ○ Define and load numeric and character arrays ○ Manipulate and print data stored in arrays ○ Define and load data into parallel arrays ○ Sort the elements in an array in ascending and descending order
7. Allocate the PIC microcontroller hardware	1 <ul style="list-style-type: none"> ○ Apply interrupts to C programs ○ Write C programs to complete I/O tasks

8. Define standard I/O and Preprocessor directives	1 <ul style="list-style-type: none"> ○ Apply the <code>#define</code>, <code>#include</code>, <code>#pragma</code> and <code>#use</code> statements ○ Use standard input and output functions to gather and output data from a program ○ Use the device specification directives to correctly select a device for a program
9. Select the appropriate C compiler for programming the PIC	1 <ul style="list-style-type: none"> ○ Create and compile a project ○ Apply the C compiler to program a target device ○ Apply a serial port monitor to send and receive RS232 communications
10. Develop a project plan	1 <ul style="list-style-type: none"> ○ Define the problem ○ Design a solution for the stated problem ○ Program and debug using a C compiler ○ Test and evaluate the solution
11. Integrate Software & Hardware	1 <ul style="list-style-type: none"> ○ Choose the appropriate method for choosing proper hardware and software components

LEARNING RESOURCES

Text: **Embedded C Programming and the Microchip PIC**, Barnett, Cox, O'Cull
ISBN: 140183748-4, Thomson Delmar Learning

Check Blackboard's external links and course documents for further helpful resources

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

THEORY: Lectures are conducted to help explain course material. Students write tests and quizzes.

PRACTICAL: Experiments are conducted in a laboratory environment.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
3 Unit Tests: Test 1: -----20% -CLR 1,2,3,4 Test 2: -----20% -CLR 5,6,7,8 Test 3: -----20% -CLR 9,10,11,12	1 Define basic concepts - [CLR 1] 1 Write modular programs - [CLR 3] 1 Select the appropriate C compiler for programming the PIC - [CLR 9] 1 Develop a project plan - [CLR 10] 1 Store data into sorted arrays - [CLR 6] 1 Define standard I/O and Preprocessor directives - [CLR 8] 1 Control program flow using branching - [CLR 5] 1 Allocate the PIC microcontroller hardware - [CLR 7] 1 Explain string functions and loops - [CLR 4] 1 Discuss the structure of a C program

	<ul style="list-style-type: none"> - [CLR 2] 1 Integrate Software & Hardware - [CLR 11] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. - [EES 9] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
<p>3 Quizzes:</p> <p>Quiz 1 -----3%</p> <p>-CLR 1,2,3,4</p> <p>Quiz 2 -----3%</p> <p>-CLR 5,6,7,8</p> <p>Quiz 4 -----4%</p> <p>-CLR 9,10,11,12</p>	<ul style="list-style-type: none"> 1 Discuss the structure of a C program - [CLR 2] 1 Define standard I/O and Preprocessor directives - [CLR 8] 1 Select the appropriate C compiler for programming the PIC - [CLR 9] 1 Develop a project plan - [CLR 10] 1 Integrate Software & Hardware - [CLR 11] 1 Control program flow using branching - [CLR 5] 1 Allocate the PIC microcontroller hardware - [CLR 7] 1 Store data into sorted arrays - [CLR 6] 1 Define basic concepts - [CLR 1] 1 Write modular programs - [CLR 3] 1 Explain string functions and loops - [CLR 4] 1 Execute mathematical operations accurately. - [EES 3] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. - [EES 9] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
<p>1 Project :</p> <p>Project 1-----24%</p> <p>-CLR 1,2,3,4,5,6, 7,8,9,10,11,and 12</p>	<ul style="list-style-type: none"> 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
Labs	<ul style="list-style-type: none"> 1 Control program flow using branching

All labs completed (lab sign off sheet submitted)-----6%

- [CLR 5]
- 1 Allocate the PIC microcontroller hardware
- [CLR 7]
- 1 Discuss the structure of a C program
- [CLR 2]
- 1 Define standard I/O and Preprocessor directives
- [CLR 8]
- 1 Store data into sorted arrays
- [CLR 6]
- 1 Explain string functions and loops
- [CLR 4]
- 1 Define basic concepts
- [CLR 1]
- 1 Write modular programs
- [CLR 3]
- 1 Select the appropriate C compiler for programming the PIC
- [CLR 9]
- 1 Develop a project plan
- [CLR 10]
- 1 Integrate Software & Hardware - [CLR 11]
- 1 Apply a systematic approach to solve problems. - [EES 4]
- 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
- 1 Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. - [EES 9]
- 1 Manage the use of time and other resources to complete projects. - [EES 10]
- 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio

- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

PIC Programmer

Safety Glasses

Closed-toed shoes

Electronics toolkit consisting of cutters, wire strippers, needle-nose pliers, protoboard, small electronic screwdriver kit, 2 oscilloscope leads, 2 BNC to alligator leads and 3 sets of meter leads.

Refer to your CSI under Course Information on Blackboard for the updated Lab and Testing Policy.

No extensions or exceptions will be permitted except for valid medical reasons approved by the Program Coordinator

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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

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 very 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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Programmable Logic Controllers

Mechanical and Transportation Technology

Course Number: ELN9207	Contribution to Program: Vocational	Normative Hours: 60
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 4	Core/Elective: Core
Prepared by: Stephen Ryan Coordinator		Approval Date: 21/06/2013
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical and Transportation Technology
Pre-Requisites ELN9211		Approved for Academic Year: 2013-2014

COURSE DESCRIPTION

The programmable logic controller has become the most powerful change to occur in the electronics world for factory automation. The ability to replace large banks of mechanical timers and relays with a software alternative has provided large cost savings in terms of equipment and upgrades. As an electro-mechanical technician, you run into the PLC in a wide variety of applications. Practical experience in interfacing the PLC to conveyor belts, motors, sensors, pneumatic circuits, level sensors, robots and more is provided. Knowledge gained demonstrates that the PLC is as important to the industrial automation world as the personal computer is to the business world.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

10 Maintain and troubleshoot automated equipment including robotic systems.(T,A)

T: Teach **A:** Assess **CP:** Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- 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,CP)
- 7 Analyze, evaluate and apply relevant information from a variety of sources.(T,A,CP)
- 8 Show respect for diverse opinions, values, belief systems and contributions of others. (T,A,CP)
- 10 Manage the use of time and other resources to complete projects.(A,CP)

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Explain the function of a Programmable Logic Controller (PLC) Identify the physical components that make up our PLC Identify each part of the PLC Trainer Identify the main sections of the PLC Programmer Software Explain the various combinations of logic when used in PLC ladder diagrams.	<ul style="list-style-type: none"> 1 be able to define the term PLC and how it is used 1 be able to identify and explain each of the physical components of the PLC 1 be able to identify and explain each part of the PLC trainer. 1 be able to identify and explain the main sections and headings of the PLC Programmer Software 1 be able to demonstrate working knowledge of the software 1 be able to identify and explain the basic logic functions in a PLC
2. Explain the mnemonics of the PLC programming software and how to	<ul style="list-style-type: none"> 1 be able to convert programs written in mnemonics to ladder and

convert back and forth to ladder programming Explain Latching and the various ways to achieve this with a PLC	<ul style="list-style-type: none"> vice versa be able to explain the parameters of a logical block demonstrate the various forms of latching available including Set, Reset, Keep explain the function of the internal inputs and outputs, demonstrate their use demonstrate external inputs and outputs including lights, sensors and forward and reverse relays for a DC motor
3. Explain the use of Timers and latching Timers and how they are used Explain Counters and the types used with your PLC	<ul style="list-style-type: none"> demonstrate the various timers provided in the Programmer software including high speed and multi-output demonstrate how to create a latched timer and explain the importance demonstrate how to reset your timer and how this can be done demonstrate all of the counters available with this PLC including straight counters, reversible counters and resets explain how you can use a counter as a timer
4. Explain Shift Registers and their various applications Explain Function Blocks and their various uses and applications	<ul style="list-style-type: none"> demonstrate the basic shift register as well as the reversible shift register
5. Explain Sequencers and the use of Indexed Addressing Explain Subroutines and how to use them properly in a program Identify Analog Inputs and how they are received by the PLC	<ul style="list-style-type: none"> Create a table for sequence programming using indexed addressing Explain all of the instruction blocks required for a sequencer and the function of each Create a subroutine using the SBS, SBN and END instructions Create an analog input and incorporate it into a running program

LEARNING RESOURCES

Text/Workbook: Programmable Logic Controllers: OMRON CJ1M – CPU 12 and CX -One Educational Version Workbook Rev F2010 Lana Michele, 2010

OMRON Programming, Operation, and Instructions Manuals

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

A large portion of this course is achieved by hands on practical experience. Some peer teaching and collaborated learning may be involved. A complete list of required labs is available on blackboard

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
Quizzes 10% 1 Quiz for each of the 5 CLR's worth 2% each	<ul style="list-style-type: none"> Explain the mnemonics of the PLC programming software and how to convert back and forth to ladder programming Explain Latching and the various ways to achieve this with a PLC - [CLR 2] Explain the use of Timers and latching Timers and how they are used Explain Counters and the types used with your PLC - [CLR 3] Explain Shift Registers and their various applications Explain Function Blocks and their various uses and applications - [CLR 4] Explain Sequencers and the use of Indexed Addressing Explain Subroutines and how to use them properly in a program

	<p>Identify Analog Inputs and how they are received by the PLC - [CLR 5]</p> <p>1 Explain the function of a Programmable Logic Controller (PLC)</p> <p>Identify the physical components that make up our PLC</p> <p>Identify each part of the PLC Trainer</p> <p>Identify the main sections of the PLC Programmer Software</p> <p>Explain the various combinations of logic when used in PLC ladder diagrams. - [CLR 1]</p> <p>1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1]</p> <p>1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]</p> <p>1 Manage the use of time and other resources to complete projects. - [EES 10]</p>
<p>Tests 60%</p> <p>1 Test for each of the 5 CLRs worth 12% each</p>	<p>1 Explain the function of a Programmable Logic Controller (PLC)</p> <p>Identify the physical components that make up our PLC</p> <p>Identify each part of the PLC Trainer</p> <p>Identify the main sections of the PLC Programmer Software</p> <p>Explain the various combinations of logic when used in PLC ladder diagrams. - [CLR 1]</p> <p>1 Explain Shift Registers and their various applications</p> <p>Explain Function Blocks and their various uses and applications - [CLR 4]</p> <p>1 Explain the mnemonics of the PLC programming software and how to convert back and forth to ladder programming</p> <p>Explain Latching and the various ways to achieve this with a PLC - [CLR 2]</p> <p>1 Explain the use of Timers and latching Timers and how they are used</p> <p>Explain Counters and the types used with your PLC - [CLR 3]</p> <p>1 Explain Sequencers and the use of Indexed Addressing</p> <p>Explain Subroutines and how to use them properly in a program</p> <p>Identify Analog Inputs and how they are received by the PLC - [CLR 5]</p>
<p>Labs 10%</p> <p>1 Completed Lab Sign off sheet 10%</p>	<p>1 Explain Shift Registers and their various applications</p> <p>Explain Function Blocks and their various uses and applications - [CLR 4]</p> <p>1 Explain the function of a Programmable Logic Controller (PLC)</p> <p>Identify the physical components that make up our PLC</p> <p>Identify each part of the PLC Trainer</p> <p>Identify the main sections of the PLC Programmer Software</p> <p>Explain the various combinations of logic when used in PLC ladder diagrams. - [CLR 1]</p> <p>1 Explain the mnemonics of the PLC programming software and how to convert back and forth to ladder programming</p>

	<p>Explain Latching and the various ways to achieve this with a PLC - [CLR 2]</p> <p>1 Explain the use of Timers and latching Timers and how they are used</p> <p>Explain Counters and the types used with your PLC - [CLR 3]</p> <p>1 Explain Sequencers and the use of Indexed Addressing</p> <p>Explain Subroutines and how to use them properly in a program</p> <p>Identify Analog Inputs and how they are received by the PLC - [CLR 5]</p>
<p>Group Projects 20%</p> <p>Two Projects, Culminating worth 13%</p> <p>Other project worth 7%</p>	<p>1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1]</p> <p>1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]</p> <p>1 Manage the use of time and other resources to complete projects. - [EES 10]</p> <p>1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8]</p>

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

Safety Glasses

Closed-toed shoes

Electronics toolkit consisting of cutters, wire strippers, needlenose pliers, protoboard, small electronic screwdriver kit, 2 oscilloscope leads, 2 BNC

to alligator leads and 3 sets of metre leads.

Refer to your CSI under Course Information on Blackboard for the updated Lab and Testing Policy.

If you are a student with a disability please identify your needs to the professor and/or the Centre for Students with Disabilities (CSD) so that support services can be arranged for you. You can do this by making an appointment at the CSD, Room C142, Ottawa, 727-4723, Ext 7683 or arranging a personal interview with the professor to discuss your needs.

Respect for Confidentiality

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.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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.

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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

DC and AC Motor Controls

Mechanical and Transportation Technology

Course Number: ELN9211	Contribution to Program: Vocational	Normative Hours: 45
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 3	Core/Elective: Core
Prepared by: Stephen Ryan Coordinator		Approval Date: 21/06/2013
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical and Transportation Technology
Pre-Requisites ELN9192		Approved for Academic Year: 2013-2014

COURSE DESCRIPTION

DC and AC motors are an intricate part of any industrial process. A thorough knowledge of how motors are controlled is a great asset to any electro-mechanical technician. Various motors and their control circuits are examined. The student gains practical experience wiring and troubleshooting single and three phase circuits using logic control, forward/reverse starters, multiple motor control, relays and timers.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|----|--|
| 2 | Interpret and produce electrical, electronic, and mechanical drawings and other related documents and graphics to appropriate engineering standards.(T,A,CP) |
| 3 | Select and use a variety of troubleshooting techniques and test equipment to assess electromechanical circuits, equipment, processes, systems, and subsystems.(T,A,CP) |
| 7 | Analyze, build, and troubleshoot logic and digital circuits, passive AC and DC circuits, and active circuits.(T,A) |
| 8 | Apply, install, test, and troubleshoot a variety of mechanical, electrical, and electronic control systems.(T,A,CP) |
| 14 | Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(T,A) |

T: Teach **A:** Assess **CP:** Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|----|--|
| 4 | Apply a systematic approach to solve problems.(T,A,CP) |
| 5 | Use a variety of thinking skills to anticipate and solve problems.(T,A,CP) |
| 9 | Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.(T,A,CP) |
| 10 | Manage the use of time and other resources to complete projects.(T,A,CP) |
| 11 | Take responsibility for one's own actions, decisions and consequences.(T,A,CP) |

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Work safely in an electrical environment.	<ul style="list-style-type: none"> 1 measuring voltages in a three phase environment 1 tag and lockout procedures 1 safe operation of meters

	<ul style="list-style-type: none"> 1 identify need for protective equipment 1 identify need and procedures for grounding of equipment
2. Communicate effectively using the terminology of the electrical industry.	<ul style="list-style-type: none"> 1 answer technical questions using the correct terminology
3. Design and analyze circuit schematics, component layouts and connection wiring diagrams.	<ul style="list-style-type: none"> 1 analyse reduced voltage and reduced current starter circuits 1 design circuits to meet given control requirements
4. Design power circuits for motors in compliance with the Canadian Electrical Code.	<ul style="list-style-type: none"> 1 section 28 CEC 1 other sections, such as transfer switches, as applicable
5. Design, install and trouble shoot circuits to control and protect AC motors.	<ul style="list-style-type: none"> 1 no-voltage release circuits 1 no-voltage protection circuits 1 reversing starter circuits 1 timer circuits 1 applications combining various circuit elements
6. Develop, test, debug and document PICO relay programming instructions for motor control applications.	<ul style="list-style-type: none"> 1 program control applications from the PICO keypad 1 program a PICO from a microcomputer using the PICO software 1 document PICO projects

LEARNING RESOURCES

Electro - Mechanical Control Experiments. 2011 edition on Blackboard

Rockis & Mazur Electrical Motor Controls, American Technical Publishers ISBN 0-8269-1671-6

Canadian Standards Association. Canadian Electrical Code Part 1 20 ed. Rexdale Ont. Canadian Standards Association 2006

Gerald A. Moberg AC and DC Motor Control, Peatson Education Canada 2006

Siemens on line course www.enm.com/eandm/training/siemenscourses.asp, specifically the four parts with www.enm.com/eandm/training/siemenscourses/cc_1.pdf

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

Worksheets, laboratory experiments, demonstrations, practise questions, online searching, ladder diagrams drawing

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
Safety Quiz 10% - Mandatory for accessing lab.	<ul style="list-style-type: none"> 1 Work safely in an electrical environment. - [CLR 1] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
Labs 30%	<ul style="list-style-type: none"> 1 Communicate effectively using the terminology of the electrical industry. - [CLR 2] 1 Work safely in an electrical environment. - [CLR 1] 1 Design power circuits for motors in compliance with the Canadian Electrical Code. - [CLR 4]

	<ul style="list-style-type: none"> 1 Design and analyze circuit schematics, component layouts and connection wiring diagrams. - [CLR 3] 1 Design, install and trouble shoot circuits to control and protect AC motors. - [CLR 5] 1 Develop, test, debug and document PICO relay programming instructions for motor control applications. - [CLR 6] 1 Apply a systematic approach to solve problems. - [EES 4] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5] 1 Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. - [EES 9] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11]
Midterm 20%	<ul style="list-style-type: none"> 1 Design and analyze circuit schematics, component layouts and connection wiring diagrams. - [CLR 3] 1 Design, install and trouble shoot circuits to control and protect AC motors. - [CLR 5] 1 Design power circuits for motors in compliance with the Canadian Electrical Code. - [CLR 4] 1 Communicate effectively using the terminology of the electrical industry. - [CLR 2] 1 Apply a systematic approach to solve problems. - [EES 4]
Practical Tests 20%	<ul style="list-style-type: none"> 1 Design power circuits for motors in compliance with the Canadian Electrical Code. - [CLR 4] 1 Design and analyze circuit schematics, component layouts and connection wiring diagrams. - [CLR 3] 1 Design, install and trouble shoot circuits to control and protect AC motors. - [CLR 5] 1 Work safely in an electrical environment. - [CLR 1] 1 Manage the use of time and other resources to complete projects. - [EES 10] 1 Take responsibility for one's own actions, decisions and consequences. - [EES 11] 1 Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
Final Exam 20%	<ul style="list-style-type: none"> 1 Design and analyze circuit schematics, component layouts and connection wiring diagrams.

- [CLR 3]

- 1 Design, install and trouble shoot circuits to control and protect AC motors.

- [CLR 5]

- 1 Communicate effectively using the terminology of the electrical industry.

- [CLR 2]

- 1 Develop, test, debug and document PICO relay programming instructions for motor control applications. - [CLR 6]

- 1 Apply a systematic approach to solve problems. - [EES 4]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

Safety Glasses
Steel toed shoes/boots

Refer to your CSI under Course Information on Blackboard for the updated Lab and Testing Policy.

If you are a student with a disability please identify your needs to the professor and/or the Centre for Students with Disabilities (CSD) so that support services can be arranged for you. You can do this by making an appointment at the CSD, Room C142, Ottawa, 727-4723, Ext 7683 or arranging a personal interview with the professor to discuss your needs.

Respect for Confidentiality

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.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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

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 very 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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Reporting Technical Information

Applied Science and Environmental Technology

Course Number: ENL1819T	Contribution to Program: Vocational	Normative Hours: 60
Applicable Program(s): Multiple Programs	AAL: Multiple Levels	Core/Elective: Multiple Core/Elective
Prepared by: Patrick Dawson Coordinator, Technical Communications FCTT		Approval Date: 31/05/2013
Co-Requisites N/A		Approved by: Patrick Dawson Acting Chair, ASET
Pre-Requisites ENL1813T		Approved for Academic Year: 2013-2014

COURSE DESCRIPTION

Students draw upon knowledge acquired through their studies and through research to improve their skills in communication, critical thinking, and the documentation, and evaluation of both primary and secondary sources. These combined skills are demonstrated in the production of workplace-oriented, vocationally-related documents and presentations. Emphasis is placed on technical communication goals which students are required to achieve for graduation.

ESSENTIAL EMPLOYABILITY SKILLS

The course contributes to your program by helping you achieve the following Essential Employability Skills:	
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,CP)
2	Respond to written, spoken or visual messages in a manner that ensures effective communication.(A,CP)
6	Locate, select, organize and document information using appropriate technology and information systems.(T,A,CP)
7	Analyze, evaluate and apply relevant information from a variety of sources.(T,A,CP)

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Prepare a variety of program-specific workplace documents.	<ul style="list-style-type: none"> 1 Recognize the differences between a variety of workplace reports: internal processes such as minutes and agendas, process documentation and operating procedures; external processes such as proposals, analysis, assessments or evaluations and progress reports. 1 Select an appropriate format, plan, draft, and edit a technical report containing coherent and logically ordered information 1 Integrate appropriate and relevant graphics, such as tables, figures, and diagrams, to support information in the document 1 Tailor the stylistic elements (tone, diction, etc.) to a document's intended purpose
2. Develop and implement strategies to maximize the benefits of information technology in the workplace.	<ul style="list-style-type: none"> 1 Select the appropriate tools for communication tasks 1 Use advanced word processing features to create professional-looking documents 1 Create graphics for written reports and oral presentations
3. Deliver an organized and complete live spoken message to meet the needs of individuals and groups within a workplace setting.	<ul style="list-style-type: none"> 1 Analyze an audience and purpose in preparation for the delivery of spoken messages 1 Plan, organize, and present information on a technical topic to individuals or a group

	<ul style="list-style-type: none"> 1 Deliver technical information orally in various workplace settings 1 Use a variety of visual aids, such as graphs, tables, diagrams, and photographs to support a technical presentation
4. Apply advanced information management skills.	<ul style="list-style-type: none"> 1 Investigate and identify the usefulness of information from a variety of potential sources 1 Gather and analyze relevant data 1 Acknowledge and document sources accurately and correctly following current referencing guidelines. 1 Integrate research material into documents and oral presentations without plagiarizing 1 Adapt information from one medium to another (e.g. a written document into an oral presentation)

LEARNING RESOURCES

Please check with your instructor before buying textbooks.

Other resources may include:

Trade and professional journals and periodicals

Films and videos

Internet resources

Algonquin College Learning Resource Centre

Electronic and print resources

Guest speakers

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

- 1 lectures
- 1 consultation meeting(s) with your professor
- 1 writing workshops
- 1 planning, writing, revising, and editing written work
- 1 research activities
- 1 student presentations
- 1 delivery of at least one live technical oral presentation within a classroom setting
- 1 working in teams
- 1 collaborative or joint assignments (between English and program courses)
- 1 class discussions
- 1 preparation of a concise, clearly-formatted updated resume and letter of application
- 1 participation in class discussions and group projects
- 1 writing of informal and formal reports using an appropriate format as determined by program needs, including, but not restricted to, evaluation, inspection or field/site review, progress, occurrence, and lab reports as well as proposals
- 1 exercises in preparing written report summaries and summary statements
- 1 exercises in presenting clear oral summaries and reports
- 1 exercises in technical analysis
- 1 exercises in describing of mechanisms, processes, and instructions
- 1 exercises in technical definitions
- 1 exercises in writing the formal report components commonly found in frontmatter and endmatter
- 1 participating in self- and peer-assessment
- 1 using electronic technology (e-mail, word processing, the Internet)

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
written assignments worth 20% of the course grade	<ul style="list-style-type: none"> 1 Prepare a variety of program-specific workplace documents. - [CLR 1] 1 Develop and implement strategies to maximize the benefits of

	<p>information technology in the workplace. - [CLR 2]</p> <ul style="list-style-type: none"> 1 Apply advanced information management skills. - [CLR 4] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6]
public speaking activities worth 30% of the course grade.	<ul style="list-style-type: none"> 1 Deliver an organized and complete live spoken message to meet the needs of individuals and groups within a workplace setting. - [CLR 3] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1]
a final report worth 40% of the course grade	<ul style="list-style-type: none"> 1 Develop and implement strategies to maximize the benefits of information technology in the workplace. - [CLR 2] 1 Apply advanced information management skills. - [CLR 4] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]
participation in class activities representing 10% of the course grade	<ul style="list-style-type: none"> 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Other

An interview, and/or a written test of writing competency, and/or a live presentation to confirm oral presentation competency, may be requested to confirm any documentation presented in a portfolio.

RELATED INFORMATION

The following information is course-specific:

In order to receive credit for the course, you must satisfactorily complete all course learning requirements.

The following information is school/department-specific:

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Healthy Lifestyle

Police and Public Safety Institute

Course Number: GEN2003	Contribution to Program: General Education	Normative Hours: 45
Applicable Program(s): Multiple Programs	AAL: Multiple Levels	Core/Elective: Multiple Core/Elective
Prepared by: Julie Rissler Professor		Approval Date: 06/06/2013
Co-Requisites N/A		Approved by: Barbara Foulds, Ph.D. Acting Dean
Pre-Requisites N/A		Approved for Academic Year: 2013-2014

COURSE DESCRIPTION

Through self-evaluation, weekly journals, research and hands-on exercises students gain the knowledge and skills necessary to lead a healthy lifestyle.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This is a general education course that supports learning in the following theme area: **Personal Understanding**

T: Teach A: Assess CP: Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience.(A)
- 2 Respond to written, spoken or visual messages in a manner that ensures effective communication.(A)
- 6 Locate, select, organize and document information using appropriate technology and information systems.(T)
- 7 Analyze, evaluate and apply relevant information from a variety of sources.(T)
- 10 Manage the use of time and other resources to complete projects.(T,A)

T: Teach A: Assess CP: Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Compare your daily diet to the Canadian Food Guide.	1 Follow and evaluate the Canadian Food Guide.
2. Estimate your daily energy requirement using food and nutrition board formulas.	1 Calculate your daily energy requirement for weight maintenance.
3. Identify weight-loss goals and way to meet them.	1 Calculate your weekly and daily negative calorie balance goals and the number of weeks to achieve your target weight. 1 Assess yourself for body image problems and eating disorders.
4. Complete lab activities to assess your physical fitness profile that will help produce your personal exercise schedule.	1 Identify and assess your exercise habits. 1 Employ an assessment to determine where you need improvement.
5. Identify various injuries, treatments and preventions.	1 Identify, treat and prevent injuries.
6. Use and identify various reliable resources in order to research how	1 To prevent or minimize the risk of cancer, heart disease and

chemical substances affect physical fitness and how to help prevent heart disease, cancer and sexually transmitted disease.	sexually transmitted diseases. 1 Describe different chemical substances and how they affect physical fitness.
7. Reflect on your own personal reactions to the topic of the week by keeping a weekly journal.	1 Record and articulate your opinion on healthy lifestyle issues.

LEARNING RESOURCES

- | | |
|---|--------------------------------|
| <ul style="list-style-type: none"> 1 Required Textbook: <u>Fit & Well</u> Third Canadian Edition Authors: Fahey, Insel, Roth, Wong. 1 Research on the Internet 1 On-line discussion groups 1 Labs | Publisher: McGraw-Hill Ryerson |
|---|--------------------------------|

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

- 1 Keeping a weekly journal.
- 1 Planning a healthy diet.
- 1 Planning an exercise schedule.
- 1 Labs.
- 1 On-line discussion groups.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
Personal Diet Plan 25%	<ul style="list-style-type: none"> 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Manage the use of time and other resources to complete projects. - [EES 10]
Exercise Schedule 25%	<ul style="list-style-type: none"> 1 Complete lab activities to assess your physical fitness profile that will help produce your personal exercise schedule. - [CLR 4] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Manage the use of time and other resources to complete projects. - [EES 10]
Weekly Journal 25%	<ul style="list-style-type: none"> 1 Reflect on your own personal reactions to the topic of the week by keeping a weekly journal. - [CLR 7] 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Manage the use of time and other resources to complete projects. - [EES 10]
Weekly Activities: 7.5% The Weekly Activities include: Injury and Prevention Learning Quiz 5 Nutrition and You Activity 2.5	<ul style="list-style-type: none"> 1 Use and identify various reliable resources in order to research how chemical substances affect physical fitness and how to help prevent heart disease, cancer and sexually transmitted disease. - [CLR 6] 1 Estimate your daily energy requirement using food and nutrition board formulas. - [CLR 2] 1 Identify weight-loss goals and way to meet them. - [CLR 3] 1 Identify various injuries, treatments and preventions. - [CLR 5] 1 Compare your daily diet to the Canadian Food Guide. - [CLR 1]

		<ul style="list-style-type: none"> 1 Complete lab activities to assess your physical fitness profile that will help produce your personal exercise schedule. - [CLR 4] 1 Reflect on your own personal reactions to the topic of the week by keeping a weekly journal. - [CLR 7] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Respond to written, spoken or visual messages in a manner that ensures effective communication. - [EES 2] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Manage the use of time and other resources to complete projects. - [EES 10]
Group Discussions	17.5%	<ul style="list-style-type: none"> 1 Use and identify various reliable resources in order to research how chemical substances affect physical fitness and how to help prevent heart disease, cancer and sexually transmitted disease. - [CLR 6] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

1 Other

Presentation of a portfolio followed by an interview.

RELATED INFORMATION

The following information is course-specific:

N.B. Please note that late assignments and make up assignments are not accepted.

The following information is school/department-specific:

STUDENT SUCCESS SPECIALIST

The Faculty Student Success Specialist is Karen Gendron in room P112. Karen may also be reached at telephone extension 7558 or by e-mail at gendrok@algonquincollege.com

ALGONQUIN COLLEGE - CODE OF CONDUCT

All members of the Algonquin Community will undertake to:

1. Conduct themselves in a manner which respects and promotes the dignity of others, and interact with others in the community in a spirit of cooperation, goodwill and mutual respect.
2. Conduct themselves in an honest and ethical manner, refraining from using their position or power to exploit any other individual, refraining from misrepresenting themselves, their work or qualifications in any manner, and refraining from violence, abuse, harassment and discrimination of any kind.
3. Assist in the maintenance of good order within their environment and refrain from creating a disturbance or a disruption to activities.

The Code of Conduct applies to students and staff of Algonquin College while at all College locations and while representing or carrying out activities related to the College at any off-campus location.

CONFIDENTIALITY

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.

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 <http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 <http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)

Industrial Robots

Mechanical and Transportation Technology

Course Number: ROB9205	Contribution to Program: Vocational	Normative Hours: 60
Applicable Program(s): 0550X01FWO EME Technician - Robotics	AAL: 4	Core/Elective: Core
Prepared by: Stephen Ryan Coordinator		Approval Date: 21/06/2013
Co-Requisites N/A		Approved by: Misheck Mwaba, PhD., P.Eng. Chair, Mechanical and Transportation Technology
Pre-Requisites ELN8303 and ELN9203		Approved for Academic Year: 2013-2014

COURSE DESCRIPTION

Students explore robotic applications and the various elements of robotic systems. They are exposed to a variety of robots and their various parts; drives, controllers, arms, sensors and end effectors. This course involves research and creativity on the part of the student and a final project that simulates an industrial process.

RELATIONSHIP TO VOCATIONAL LEARNING OUTCOMES

This course contributes to your program by helping you achieve the following Vocational Learning Outcomes:

EME Technician - Robotics 0550X01FWO

- | | |
|----|--|
| 8 | Apply, install, test, and troubleshoot a variety of mechanical, electrical, and electronic control systems.(T,A,CP) |
| 9 | Install and troubleshoot basic computer hardware and programming to support the electromechanical engineering environment. (T,A,CP) |
| 10 | Maintain and troubleshoot automated equipment including robotic systems.(T,A,CP) |
| 14 | Perform all work in accordance with relevant law, policies, codes, regulations, safety procedures, and standard shop practices.(T,A) |

T: Teach **A:** Assess **CP:** Culminating Performance

ESSENTIAL EMPLOYABILITY SKILLS

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

- | | |
|---|--|
| 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,CP) |
| 6 | Locate, select, organize and document information using appropriate technology and information systems.(T,A) |
| 7 | Analyze, evaluate and apply relevant information from a variety of sources.(T,A,CP) |
| 8 | Show respect for diverse opinions, values, belief systems and contributions of others. (T,A,CP) |

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS When you have earned credit for this course, you will have demonstrated the ability to:	EMBEDDED KNOWLEDGE AND SKILLS
1. Understand and Observe all safety rules associated with the robots	<ul style="list-style-type: none"> 1 Define the basic components of a robot 1 Describe the various types of robots 1 Describe the various types of motors used for robot control 1 Describe the various types of drives 1 Explain the different types of encoders

	<ul style="list-style-type: none"> 1 Explain the purpose and part of the Controller 1 Explain the different types of safety measures i.e. behaviour, equipment etc.
2. Extrapolate information from data sheets and manuals	<ul style="list-style-type: none"> 1 Describe basic safety and setup procedures for a robot, from the instructions in the manual 1 Explain the various manuals for each robot and what their purpose is 1 Explain how to locate required information in a manual or data sheet 1 Explain the differences between your robots in terms of their specifications
3. Write software and program the Robots	<ul style="list-style-type: none"> 1 Program the robot for basic pick and place 1 Design a robotic process including sensors, pneumatics and conveyor systems and demonstrate to the professor 1 Explain the various programming techniques and languages of our Robots 1 Explain the I/O interface and wiring required for input sensors and output devices including both PNP and NPN types
4. Interface with the outside world through external I/O	<ul style="list-style-type: none"> 1 Demonstrate how to test and monitor I/O through software 1 Demonstrate how to use external sensors and devices

LEARNING RESOURCES

Learning resources will include:

Industrial Robot Fundamentals Workbook Lana Michele 2009

User Manuals
Programming Manuals
CRS F3 Robcomm Lab Manual
Other Manuals as available
Internet Research of Data sheets as needed

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

A large portion of this course is achieved by hands on practical experience. Some peer teaching and collaborated learning may be involved. A complete list of required labs is available on blackboard.

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
Quizzes 10%	<ul style="list-style-type: none"> 1 Write software and program the Robots - [CLR 3] 1 Understand and Observe all safety rules associated with the robots - [CLR 1] 1 Extrapolate information from data sheets and manuals - [CLR 2] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]
Sensor Project 5%	<ul style="list-style-type: none"> 1 Extrapolate information from data sheets and manuals - [CLR 2]

	<ul style="list-style-type: none"> 1 Interface with the outside world through external I/O - [CLR 4] 1 Understand and Observe all safety rules associated with the robots - [CLR 1] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8]
Labs 10%	<ul style="list-style-type: none"> 1 Write software and program the Robots - [CLR 3] 1 Understand and Observe all safety rules associated with the robots - [CLR 1] 1 Extrapolate information from data sheets and manuals - [CLR 2] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7]
Final Project 15%	<ul style="list-style-type: none"> 1 Write software and program the Robots - [CLR 3] 1 Understand and Observe all safety rules associated with the robots - [CLR 1] 1 Extrapolate information from data sheets and manuals - [CLR 2] 1 Interface with the outside world through external I/O - [CLR 4] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1] 1 Locate, select, organize and document information using appropriate technology and information systems. - [EES 6] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Show respect for diverse opinions, values, belief systems and contributions of others. - [EES 8]
Tests 60%	<ul style="list-style-type: none"> 1 Understand and Observe all safety rules associated with the robots - [CLR 1] 1 Extrapolate information from data sheets and manuals - [CLR 2] 1 Write software and program the Robots - [CLR 3] 1 Analyze, evaluate and apply relevant information from a variety of sources. - [EES 7] 1 Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. - [EES 1]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

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

OTHER COURSE 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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways.

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 of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- 1 Portfolio
- 1 Challenge Exam
- 1 Performance Test
- 1 Project/Assignment

RELATED INFORMATION

The following information is course-specific:

Required Equipment:

Safety Glasses

Closed-toed shoes

Electronics toolkit consisting of cutters, wire strippers, needle-nose pliers, protoboard, small electronic screwdriver kit, 2 oscilloscope leads, 2 BNC to alligator leads and 3 sets of metre leads.

Refer to your CSI under Course Information on Blackboard for the updated Lab and Testing Policy.

If you are a student with a disability please identify your needs to the professor and/or the Centre for Students with Disabilities (CSD) so that support services can be arranged for you. You can do this by making an appointment at the CSD, Room C142, Ottawa, 727-4723, Ext 7683 or arranging a personal interview with the professor to discuss your needs.

Respect for Confidentiality

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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways.

The following information is school/department-specific:

GENERAL CLAUSES - School of Advanced Technology

Harassment/Discrimination/Violence will not be tolerated. Any form of harassment (sexual, racial, gender or disability-related), discrimination (direct or indirect), or violence, whether towards a professor 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 Policy - HR22.

Harassment means one or a series of vexatious comment(s) 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, academic penalties, 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.

The Use of Electronic Devices, with the sound turned on, during classes is strictly prohibited. In particular, cell phones are not to be used to communicate during a class. The use of any electronic devices during exams and mid-term tests, other than those sanctioned by the faculty in charge of the examination, is strictly prohibited.

Anyone caught using a prohibited device will be considered to have plagiarized, and will be treated as such in accordance with College Plagiarism Policy. For further details on this directive, consult the Algonquin College Policy AA32 on the use of Electronic Devices in Class and Exams.

The School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Honesty defines plagiarism as an attempt to use or pass off as one's own idea or product, work of another without giving credit. Plagiarism has occurred in instances where a student either directly copies another person's work without acknowledgement; or, closely paraphrases the equivalent of a short paragraph or more without acknowledgement; or, borrows, without acknowledgement, any ideas in a clear and recognizable form in such a way as to present them as one's own thought, where such ideas, if they were the student's own would contribute to the merit of his or her own work.

Plagiarism is one of the most serious academic offenses a student can commit. Anyone found guilty will, on the first offense, be given a written warning and an F on the plagiarized work. If the student commits a second offense, an F will be given for the course along with a written warning. A third offense will result in suspension from the program and/or the college.

For further details on this directive, consult the Algonquin College Policy - AA20 and the School of Advanced Technology's Standard Operating Procedure on Plagiarism and Academic Dishonesty.

Respect for Confidentiality

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 publicly either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways

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 very 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 hearings 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 Policy - SA07.

June 15, 2012

The following information is College-wide:

Email

Algonquin College provides all full-time students with an e-mail 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 events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)

If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*

Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 <http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf> and AA20 <http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf>

Student Course Feedback*

It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25

<http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf>

Use of Electronic Devices in Class*

With the proliferation of small, personal electronic 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 is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32

<http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf>

Transfer of Credit

Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

* College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at: (<http://www2.algonquincollege.com/directives/>)