

Fanshawe College

## FIRST: Fanshawe Innovation, Research, Scholarship, Teaching

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Documentation (Approvals etc...)

Electronics and Embedded Systems  
Development

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2015

### **FANS 04008- Electronics and Embedded Systems Development CVS Application - non-funded**

Fanshawe College

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## APPLICATION FORM FOR PROGRAM PROPOSAL

<b>A. Funding Request:</b> This proposal will be sent to the MTCU for Approval for Funding. <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
<b>B. College Name:</b> Fanshawe College		
<b>C. College Contact(s):</b> Person responsible for this proposal.  <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <b>Name:</b> Tracy Gedies  <b>Title:</b> Director, Centre for Academic Excellence  <b>Telephone:</b> 519-452-4430 #4733  <b>E-mail:</b> TGedies@fanshawec.ca         </td> <td style="width: 50%; border: none;"> <b>Name:</b> Steve Crema  <b>Title:</b> Acting Chair- School of Applied Science and Technology  <b>Telephone:</b> 519-452-4430 Ext. 4590  <b>E-mail:</b> screma@fanshawec.ca         </td> </tr> </table>	<b>Name:</b> Tracy Gedies <b>Title:</b> Director, Centre for Academic Excellence <b>Telephone:</b> 519-452-4430 #4733 <b>E-mail:</b> TGedies@fanshawec.ca	<b>Name:</b> Steve Crema <b>Title:</b> Acting Chair- School of Applied Science and Technology <b>Telephone:</b> 519-452-4430 Ext. 4590 <b>E-mail:</b> screma@fanshawec.ca
<b>Name:</b> Tracy Gedies <b>Title:</b> Director, Centre for Academic Excellence <b>Telephone:</b> 519-452-4430 #4733 <b>E-mail:</b> TGedies@fanshawec.ca	<b>Name:</b> Steve Crema <b>Title:</b> Acting Chair- School of Applied Science and Technology <b>Telephone:</b> 519-452-4430 Ext. 4590 <b>E-mail:</b> screma@fanshawec.ca	
<b>D. Proposed Program Title:</b> <a href="#">Electronics and Embedded Systems Development</a>		
<b>E. Proposed Credential:</b> Please select one (1). <input type="checkbox"/> Local Board Approved Certificate <input type="checkbox"/> Ontario College Certificate <input type="checkbox"/> Ontario College Diploma <input type="checkbox"/> Ontario College Advanced Diploma <input checked="" type="checkbox"/> Ontario College Graduate Certificate		
<b>F. Program Maps (Appendix A):</b> Please complete and attach the two (2) Program Maps. <u>Form 1-</u> Vocational Program Learning Outcomes <u>Form 2-</u> Essential Employability Skills Outcomes		
<b>G. Program Description (Appendix B):</b> Please complete and attach the Program Description Form.		
<b>H. Program Curriculum (Appendix C):</b> Please complete and attach the Program Curriculum Form.		
<b>I. Regulatory Status Form (Appendix D):</b> Please complete and attach the Regulatory Status Form.		
<b>J. Date of Submission to CVS:</b>		
<b>FOR CVS USE ONLY</b>		
<b>K. Date of CVS Response:</b> <a href="#">August 12, 2015</a>		
<b>L. CVS Validation Decision:</b> <input checked="" type="checkbox"/> Proposal Validated. APS Number: <a href="#">FANS 04008</a> Reason: <a href="#">Aligns with existing program description (MTCU code 75206).</a> <input type="checkbox"/> Proposal not Validated. Reason:		
<b>M. CVS Signature:</b> Geneviève Paquette		

Send the completed form and required appendices to: [belfer@ocqas.org](mailto:belfer@ocqas.org). For detailed information on how to complete the *Application Form for Program Proposal*, please refer to the *Instructions for Submission of Program Proposal* document at [www.ocqas.org](http://www.ocqas.org).



## INTRODUCTION

The process established by the Credentials Validation Service (CVS) is designed to be a streamlined, seamless, effective, and efficient process that will allow colleges to submit and receive validation requests and decisions in a timely manner. The document with the instructions to complete this form (*CVS Instructions for Submission of Program Proposal*) is available to all colleges on the OCQAS website ([www.ocqas.org](http://www.ocqas.org)).



**F. PROGRAM MAPS (APPENDIX A): Form 1 - Vocational Program Learning Outcomes**

<b>Provincial Vocational Program Outcomes</b> <input type="checkbox"/> Provincial Program Standard, <i>or</i> <input checked="" type="checkbox"/> Provincial Program Description <i>MTCU code:</i> <b>75206 Embedded Systems Development</b>	<b>Fanshawe College</b> <b>Proposed Program Vocational Learning Outcomes</b>	<b>Course Title / Course Code</b>	
1. Provide a customer solution that meets quality standards and satisfies customer requirements for embedded systems products. 6. Work with diverse teams consisting of hardware and software specialists.	<ul style="list-style-type: none"> <li>Plan, implement and manage electronic and embedded systems projects in response to stakeholder and industry needs and requirements.</li> </ul>	BUSI-XXXX COMM-XXXX ELEC-XXXX BUSI-XXXX COMM -XXXX	Project Management Industrial Communications Practical Project Business of Electronics Project Communications
2. Solve complex embedded systems problems through research, experimentation, integration of computer hardware and software, and the use of electronic instrumentation.	<ul style="list-style-type: none"> <li>Solve complex embedded systems problems through research, experimentation, integration of computer hardware and software, and the use of electronic instrumentation.</li> </ul>	ELEC-XXXX ELEC-XXXX  ELEC-XXXX BUSI-XXXX ELEC-XXXX ELEC-XXXX COMM -XXXX	Electronic Components and Processes Electronic Documentation and Graphics  Embedded Systems I Project Management Embedded Systems II Practical Project Project Communications
3. Design, develop, test, configure and maintain embedded systems.	<ul style="list-style-type: none"> <li>Design, develop, test, configure and maintain electronic and embedded systems.</li> </ul>	ELEC-XXXX ELEC-XXXX  ELEC-XXXX BUSI-XXXX ELEC-XXXX ELEC-XXXX	Electronic Components and Processes Electronic Documentation and Graphics  Embedded Systems I Project Management Embedded Systems II Practical Project
4. Integrate engineering skills and knowledge with current business strategies to provide cost-effective and economically sound embedded solutions to product realization problems.	<ul style="list-style-type: none"> <li>Develop a business plan integrating marketing and entrepreneurship strategies that support sustainable electronic and embedded technologies for local and international trade.</li> </ul>	BUSI-XXXX COMM-XXXX ELEC-XXXX BUSI-XXXX ELEC-XXXX COMM -XXXX	Project Management Industrial Communications Practical Project Business of Electronics Sustainability in Technology Project Communications



<p>5. Adhere to professional, ethical and legal codes of practice and comply with industrial, labour, and environmental legislation.</p>	<ul style="list-style-type: none"> <li>Complete work in compliance with relevant legislation, established standards, policies, regulations, and ethical principles.</li> </ul>	<p>ELEC-XXXX          ELEC-XXXX            ELEC-XXXX          BUSI-XXXX          COMM-XXXX          ELEC-XXXX          ELEC-XXXX          BUSI-XXXX          ELEC-XXXX          COMM -XXXX</p>	<p>Electronic Components and Processes          Electronic Documentation and Graphics          Embedded Systems I          Project Management          Industrial Communications          Embedded Systems II          Practical Project          Business of Electronics          Sustainability in Technology          Project Communications</p>
<p>7. Convey product specifications, requirements and other relevant product documentation using current and relevant communication techniques and language.</p>	<ul style="list-style-type: none"> <li>Prepare and present electronic engineering reports using effective communication strategies.</li> </ul>	<p>BUSI-XXXX          COMM-XXXX          ELEC-XXXX          BUSI-XXXX          ELEC-XXXX          COMM -XXXX</p>	<p>Project Management          Industrial Communications          Practical Project          Business of Electronics          Sustainability in Technology          Project Communications</p>



**F. PROGRAM MAPS (APPENDIX A): Form 2 – Essential Employability Skills Outcomes**

Skill Categories	Defining Skills Skill areas to be demonstrated by the graduates	Essential Employability Skills Outcomes The graduate has reliably demonstrated the ability to:	Course Title / Course Codes <i>(As indicated in Appendix A)</i>	
<b>Communication</b>	<ul style="list-style-type: none"> <li>• Reading</li> <li>• Writing</li> <li>• Speaking</li> <li>• Listening</li> <li>• Presenting</li> <li>• Visual Literacy</li> </ul>	<ul style="list-style-type: none"> <li>• communicate clearly, concisely, and correctly in the written, spoken, and visual form that fulfils the purpose and meets the needs of the audience</li> </ul>	ELEC-XXXX  BUSI-XXXX COMM-XXXX ELEC-XXXX BUSI-XXXX COMM -XXXX	Electronic Documentation and Graphics Project Management Industrial Communications Practical Project Business of Electronics Project Communications
		<ul style="list-style-type: none"> <li>• respond to written, spoken, or visual messages in a manner that ensures effective communication</li> </ul>	ELEC-XXXX  BUSI-XXXX COMM-XXXX ELEC-XXXX BUSI-XXXX COMM -XXXX	Electronic Documentation and Graphics Project Management Industrial Communications Practical Project Business of Electronics Project Communications
<b>Numeracy</b>	<ul style="list-style-type: none"> <li>• Understanding and applying mathematical concepts and reasoning</li> <li>• Analysing and using numerical data</li> <li>• Conceptualizing</li> </ul>	<ul style="list-style-type: none"> <li>• execute mathematical operations accurately</li> </ul>	ELEC-XXXX ELEC-XXXX  ELEC-XXXX BUSI-XXXX ELEC-XXXX ELEC-XXXX	Electronic Components and Processes Electronic Documentation and Graphics Embedded Systems I Project Management Embedded Systems II Practical Project
<b>Critical Thinking &amp; Problem</b>	<ul style="list-style-type: none"> <li>• Analysing</li> <li>• Synthesizing</li> </ul>	<ul style="list-style-type: none"> <li>• apply a systematic approach to solve problems</li> </ul>	ELEC-XXXX ELEC-XXXX	Electronic Components and Processes Electronic Documentation and Graphics



Skill Categories	Defining Skills Skill areas to be demonstrated by the graduates	Essential Employability Skills Outcomes The graduate has reliably demonstrated the ability to:	Course Title / Course Codes <i>(As indicated in Appendix A)</i>	
<b>Solving</b>	<ul style="list-style-type: none"> <li>Evaluating</li> <li>Decision-making</li> <li>Creative and innovative thinking</li> </ul>		ELEC-XXXX BUSI-XXXX ELEC-XXXX ELEC-XXXX BUSI-XXXX ELEC-XXXX	Embedded Systems I Project Management Embedded Systems II Practical Project Business of Electronics Sustainability in Technology
		<ul style="list-style-type: none"> <li>use a variety of thinking skills to anticipate and solve problems</li> </ul>	ELEC-XXXX ELEC-XXXX  ELEC-XXXX BUSI-XXXX ELEC-XXXX ELEC-XXXX BUSI-XXXX ELEC-XXXX	Electronic Components and Processes Electronic Documentation and Graphics  Embedded Systems I Project Management Embedded Systems II Practical Project Business of Electronics Sustainability in Technology
<b>Information Management</b>	<ul style="list-style-type: none"> <li>Gathering and managing information</li> <li>Selecting and using appropriate tools and technology for a task or a project</li> <li>Computer literacy</li> <li>Internet skills</li> </ul>	<ul style="list-style-type: none"> <li>locate, select, organize, and document information using appropriate technology and information systems</li> </ul>	ELEC-XXXX  ELEC-XXXX BUSI-XXXX COMM-XXXX ELEC-XXXX ELEC-XXXX BUSI-XXXX ELEC-XXXX COMM -XXXX	Electronic Documentation and Graphics Embedded Systems I Project Management Industrial Communications Embedded Systems II Practical Project Business of Electronics Sustainability in Technology Project Communications
		<ul style="list-style-type: none"> <li>analyse, evaluate, and apply relevant</li> </ul>	ELEC-XXXX	Electronic Documentation and



Skill Categories	Defining Skills Skill areas to be demonstrated by the graduates	Essential Employability Skills Outcomes The graduate has reliably demonstrated the ability to:	Course Title / Course Codes <i>(As indicated in Appendix A)</i>	
		information from a variety of sources	BUSI-XXXX COMM-XXXX ELEC-XXXX ELEC-XXXX BUSI-XXXX ELEC-XXXX COMM -XXXX	Graphics Project Management Industrial Communications Embedded Systems II Practical Project Business of Electronics Sustainability in Technology Project Communications
Inter-personal	<ul style="list-style-type: none"> <li>• Team work</li> <li>• Relationship management</li> <li>• Conflict resolution</li> <li>• Leadership</li> <li>• Networking</li> </ul>	<ul style="list-style-type: none"> <li>• show respect for the diverse opinions, values, belief systems, and contributions of others</li> </ul>	ELEC-XXXX BUSI-XXXX COMM-XXXX ELEC-XXXX BUSI-XXXX ELEC-XXXX COMM -XXXX	Embedded Systems I Project Management Industrial Communications Practical Project Business of Electronics Sustainability in Technology Project Communications
		<ul style="list-style-type: none"> <li>• interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals</li> </ul>	ELEC-XXXX BUSI-XXXX COMM-XXXX ELEC-XXXX ELEC-XXXX BUSI-XXXX COMM -XXXX	Embedded Systems I Project Management Industrial Communications Embedded Systems II Practical Project Business of Electronics Project Communications
Personal	<ul style="list-style-type: none"> <li>• Managing self</li> <li>• Managing change and being flexible and adaptable</li> </ul>	<ul style="list-style-type: none"> <li>• manage the use of time and other resources to complete projects</li> </ul>	ELEC-XXXX ELEC-XXXX ELEC-XXXX	Electronic Components and Processes Electronic Documentation and Graphics Embedded Systems I





Skill Categories	Defining Skills Skill areas to be demonstrated by the graduates	Essential Employability Skills Outcomes The graduate has reliably demonstrated the ability to:	Course Title / Course Codes <i>(As indicated in Appendix A)</i>	
	<ul style="list-style-type: none"> <li>Engaging in reflective practice</li> <li>Demonstrating personal responsibility</li> </ul>		BUSI-XXXX ELEC-XXXX ELEC-XXXX BUSI-XXXX ELEC-XXXX COMM -XXXX	Project Management Embedded Systems II Practical Project Business of Electronics Sustainability in Technology Project Communications
		<ul style="list-style-type: none"> <li>take responsibility for one's own actions, decisions, and consequences</li> </ul>	ELEC-XXXX ELEC-XXXX  ELEC-XXXX BUSI-XXXX COMM-XXXX ELEC-XXXX ELEC-XXXX BUSI-XXXX COMM -XXXX	Electronic Components and Processes Electronic Documentation and Graphics  Embedded Systems I Project Management Industrial Communications Embedded Systems II Practical Project Business of Electronics Project Communications



## G. PROGRAM DESCRIPTION (APPENDIX B)

### Program Description

This graduate certificate program is designed to enhance and build on the theoretical knowledge gained from studies in electrical engineering and provides students with training in various electrical technologies, embedded systems and computer aided design (CAD) with a focus on automation, robotic and control systems. Topics related to the business of electronics, entrepreneurship, importing, exporting and renewable and sustainable energies will be reviewed. An applied capstone project will provide students with the opportunity to design, implement and manage real world solutions using skills in industrial communications, supervision, project management and documentation.

### Laddering Opportunities

*Provide a brief description of known laddering into and from the proposed program, e.g. certificate to diploma, diploma to degree, apprenticeship to college, diploma to apprenticeship, college to college, diploma to college degree, etc.*

Graduates from a diploma or degree related to electrical and electronics would be eligible to apply to the “Electronics and Embedded Systems Development” program. Students who have successfully completed first, second or third Year of Mechanical Engineering at a Canadian Engineering Accreditation Board approved Canadian University or equivalent international credentials may also apply.

### Occupational Areas

*Provide a brief description of where it is anticipated graduates will find employment.*

Graduates from this program will have the knowledge and skills to design and implement new embedded solutions for industry or for entrepreneurial endeavours. Positions may include electronic or embedded hardware designer, software specialist, systems specialist or manager, embedded solutions tester, project manager or industry consultant.

### Proposed Program Vocational Learning Outcomes

*Provide the list of the proposed program vocational learning outcomes. These outcomes should be listed, verbatim as they appear in Appendix A- Form 1.*

#### ***The graduate has reliably demonstrated the ability to:***

1. Plan, implement and manage electronic and embedded systems projects in response to stakeholder and industry needs and requirements.
2. Solve complex embedded systems problems through research, experimentation, integration of computer hardware and software, and the use of electronic instrumentation.
3. Design, develop, test, configure and maintain electronic and embedded systems.
4. Develop a business plan integrating marketing and entrepreneurship strategies that support sustainable electronic and embedded technologies for local and international trade.
5. Complete work in compliance with relevant legislation, established standards, policies, regulations, and ethical principles.
6. Prepare and present electronic engineering reports using effective communication strategies.

### Admission Requirements

One of:

A Three-year College Diploma, or a Degree in Electrical or Electronic Engineering – OR – Successful completion of



First, Second or Third Year of Mechanical Engineering at a Canadian Engineering Accreditation Board approved Canadian University or equivalent international credentials – OR – Other relevant disciplines may also be considered, such as software engineering, computer engineering technology, computer science and others that offer a significant degree of electronics and software development in their curriculum.

### **English Language Requirements**

Applicants whose first language is not English will be required to demonstrate proficiency in English by one of the following methods:

- A Grade 12 College Stream or University Stream English credit from an Ontario Secondary School, or equivalent, depending on the program's Admission Requirements
- Test of English as a Foreign Language (TOEFL) test with a minimum score of 570 for the paper-based test (PBT), or 88 for the Internet-based test (iBT), with test results within the last two years
- International English Language Testing System (IELTS) test with an overall score of 6.5 with no score less than 6.0 in any of the four bands, with test results within the last two years
- Canadian Academic English Language (CAEL) test with an overall score of 70 with no score less than 60 in any of the four bands, with test results within the last two years
- An English Language Evaluation (ELE) at Fanshawe College with a minimum score of 75% in all sections of the test, with test results within the last two years



### H. PROGRAM CURRICULUM (APPENDIX C)

Sem	Course Code/ Course Title (As indicated in Appendix A)		General Ed Course (indicate with an X)	Total Course Hours	Course Description
1	ELEC-XXXX	Electronic Components and Processes		60	This course covers topics related to electronic circuit construction, prototyping and testing using current quality assurance standards. Methods, requirements and acceptance of circuit rework, repair and modifications of electronic and cable/wire harness assemblies is studied. Students will design a project using printed circuit board design software and create and verify prototypes of circuits while using test equipment safely.
1	ELEC-XXXX	Electronic Documentation and Graphics		60	This course covers practical electronic circuit design, simulation, prototyping and testing, including amplification, voltage regulation, power supply design, and sensor and signal conditioning circuits. Other topics related to electronic systems design are investigated.
1	ELEC-XXXX	Embedded Systems I		75	This course will introduce students to programming and testing of embedded systems through project based experience. Working in teams, students will configure, implement and test embedded systems prototypes to provide real-world solutions.
1	BUSI-XXXX	Project Management		45	Students will be introduced to project management principles, including how to manage the components and tasks related to complex projects involving multiple individuals and teams. Through a structured multi-tiered approach, students will identify and manage risks associated with project development and implementation.
1	COMM-XXXX	Industrial Communications		60	This course provides students with the knowledge and skills to communicate effectively in the engineering field. Students will prepare and present electronic engineering reports using current technologies and effective communication strategies within a business environment. Key concepts related to copyright, intellectual property and research proposal writing are reviewed.
2	ELEC-XXXX	Embedded Systems II		75	This course builds on information learned in Embedded Systems 1, with a focus on design, networking and Real-time Operating Systems (RTOS). Students will participate in hands-on design, configuration, implementation and testing of a prototype of a networked embedded system with an RTOS.
2	ELEC-XXXX	Practical Project		75	In this course, students will work in teams to plan,



					implement and evaluate industry related projects that integrate key concepts of electronic and embedded systems development. Working collaboratively, students will research, design and verify electronic and embedded systems including documentation of results according to industry accepted standards and ethical principles. Problem solving, communication and time management skills will be emphasized.
2	BUSI-XXXX	Business of Electronics		60	Students will develop a business plan that integrates marketing and entrepreneurship strategies within a global economy. Risk management tools related to importing, exporting, taxation, product liability and intellectual property and competition will be examined. Students will investigate best practices for the successful and legal exchange of goods and services across borders, including export support services and programs available to many Canadian companies.
2	ELEC-XXXX	Sustainability in Technology		45	This course will review the government jurisdictions, regulatory agencies and legislation that supports compliance and sustainability within the electronics industry. Through independent research and case studies, students will complete a baseline assessment and develop an action plan by applying key concepts within a sustainability framework to solve industry related problems. Students will develop the communication, analytical and critical thinking skills required to be effective advocates of change.
2	COMM-XXXX	Project Communications		45	Students will prepare interim reports, submit final project documentation and present the results of their practical field project to peers using effective written and oral communication strategies. Students will examine the values, customs and communication styles of cultural groups, with an emphasis on implications for business. An understanding of different cultures and cross-cultural challenges will provide students with a framework for professional conduct and international business communications.



## I. REGULATORY STATUS FORM (APPENDIX D)

Please complete the following:

*There IS a legislative requirement that program graduates must be certified or licensed by a regulatory authority to practice or work in the occupation*

- Mandatory recognition of a regulatory authority exists and is being sought.**  
(Please refer to Section A below- *Mandatory Regulatory Requirements*)

*There IS or IS NOT a voluntary (i.e., not required by legislation) licensing or certification for entry to practice in the profession or trade.*

- YES  
 NO

- Voluntary recognition of a regulatory authority IS being sought.**  
(Please refer to Section B below- *Recognition by Voluntary Association*)

- Voluntary recognition is NOT being sought\*.**  
Please explain why: [Click here to enter text.](#)

*\*Note: There may be titling implications for programs that are not seeking recognition in an area where existing programs have secured recognition.*



## A. MANDATORY REGULATORY REQUIREMENTS

Where licensing or certification is **required by legislation** for entry to practice in the profession or trade, the Ministry of Training, Colleges and Universities requires that colleges ensure that their programs will meet the requirements of the regulatory body in order to be approved for funding.

Name of regulatory authority:

**Status** (please select ALL that apply)

Accreditation or approval by the regulatory authority / designated third party received.

Date of recognition:

The college is working toward accreditation with the regulatory authority/ designated third party.

Describe current status of application:

Expected date of recognition:

The regulatory authority does not accredit educational programs directly or through designated third party. Formal acknowledgement (e.g. in its published or legislated registration requirements) that the program graduates will be eligible to write any required certifying or registration exam(s) or that the program is otherwise recognized for the purposes of certifying or registering a graduate is being sought.

**Please submit an acknowledgement and/or evidence from the regulatory authority regarding the status of the recognition.**



## B. RECOGNITION BY VOLUNTARY ASSOCIATION

Colleges may choose to have a program accredited or recognized by a voluntary membership organization or association. Graduate eligibility for association recognition or adherence to standards imposed by the body is **a recommendation and not a requirement** for program funding approval by the Ministry of Training, Colleges and Universities.

Name of voluntary association:

**Status** (please select ALL that apply)

The college is working toward recognition.

Describe current status of application:

Expected date of recognition:

Recognition has been received.

Date of recognition:

Type of recognition (e.g. accreditation, graduates eligible to write membership exams, etc.):

The association does not recognize educational programs directly or through designated third party. Formal recognition (e.g. in its published requirements) that the program graduates will be eligible to write any required certifying or registration exam(s) or that the program is otherwise recognized for the purposes of certifying or registering a graduate is being sought.

**Please submit an acknowledgement and/or evidence from the regulatory authority or voluntary association regarding the status of the recognition.**