



LAKEHEAD UNIVERSITY

FACULTY OF ENGINEERING

CHANGE REQUEST REPORT

Change Request Tracking Number: 2021-ENG-7792

Title of Change Request: Programs – New Programs – UG – Engineering – Mechatronics

Status of Change Request: In Workflow

Change Request can be split

CHANGE REQUEST CONTENTS

#	Type	Title
1.	New Program	Bachelor of Engineering (Mechatronics Engineering)
2.	New Program	Engineering Technology Diploma

CHANGE REQUEST HISTORY

Workflow Stage	Action Type	Action Taken By	Change Made	Action Rationale	Date
Initiator	Approved	Wilson Wang	No	Submitted to workflow	10/15/2021, 10:30 AM
Submission Review (Deputy Provost)	Approved	Deputy Provost	No	In correct workflow.	10/19/2021, 12:34 PM
Advisory Panel Review	Approved	Deputy Provost	No	Advisory Panel reviewed original submission (2021-ENG-7713) and recognized that a new CN submission was required to separate out admission, regulations, new courses, and the new program. This submission (2021-ENG-7792) reflects those changes.	10/19/2021, 12:37 PM
Dean and Faculty Council Review Stage	Approved	Laura Parker	No	approved at Fac. Council	10/19/2021, 02:25 PM

Senate – Referral Stage	Approved	Senate Admin	No	Added to November 29, 2021 Senate Referral memo.	10/20/2021, 11:42 AM
SAC–Quality Assurance	Relegated	Deputy Provost	No	Relegated back to include Dean of SSH in Additional Deans Stage.	10/27/2021, 04:40 PM
Initiator	Approved	Wilson Wang	No	Dear Dr. Koster, Please let me know if you have questions. Thank you very much. Best regards Wilson Wang	11/01/2021, 09:49 AM
Submission Review (Deputy Provost)	Approved	Deputy Provost	No	Updates to proposal brief provided, additional Deans Stage added.	11/01/2021, 11:48 AM
Advisory Panel Review	Approved	Deputy Provost	No	No additional review required by Advisory panel.	11/01/2021, 11:49 AM
Dean and Faculty Council Review Stage	Approved	Laura Parker	No	approved	11/03/2021, 04:51 PM
Senate – Referral Stage	Approved	Senate Admin	No	Previously added to the November 29, 2021 Senate Referral memo.	11/04/2021, 01:49 PM
SAC–Quality Assurance	Approved	Administrative Assistant to Provost & VP (Academic)	No	SAC–QA approved the proposal brief via electronic vote on November 11, 2021.	11/12/2021, 11:03 AM
Senate Academic Committee	Approved	Administrative Assistant to Provost & VP (Academic)	No	The request was approved via electronic vote on Monday, November 15, 2021.	11/15/2021, 08:48 AM
Senate Budget Committee	Relegated	Admin SBC	No	Relegate Change Request made on January 14, 2022 as per Dr. Wang's email request.	01/14/2022, 02:02 PM
Initiator	Approved	Wilson Wang	No	Dear Dr. Barnett and Dr. Cui, Based on the comments from the SBC, we have made the corresponding revisions to our New Program Proposal Brief for Mechatronics Engineering,	01/15/2022, 08:58 AM

				<p>which are summarized in the documents of Summary of Changes dated on Dec. 6, 2021 and Jan. 13, 2022. Please let me know if you have questions. Many thanks. Kind Regards Wilson Wang</p> <p>Relegate Change Request made on January 17, 2022 as per Dr. Wang's email request.</p> <p>Dear Dr. Barnett and Dr. Cui, We have finished revising the Proposal Brief and related documents based suggestions from the SBC. Please let me know if you have any other questions. Thank you very for your quick approval so that we could conduct the external review in February. Best regards Wilson Wang</p> <p>Written resolution adopted by the Senate Budget Committee on February 4, 2022.</p> <p>The site visit was completed on March 21-23, 2022. The reviewer report was received on May 17, 2022.</p> <p>SAC-QA met on September 14, 2022 and approved this request.</p> <p>SAC met on October 12, 2022 and approved this request.</p>	
Senate Budget Committee	Relegated	Admin SBC	No		01/17/2022, 01:16 PM
Initiator	Approved	Wilson Wang	No		01/17/2022, 04:18 PM
Senate Budget Committee	Approved	Admin SBC	No		02/07/2022, 09:39 AM
Site Visit – External Review Team	Approved	Administrative Assistant to Provost & VP (Academic)	No		09/13/2022, 11:34 AM
Quality Assurance	Approved	Administrative Assistant to Provost & VP (Academic)	No		09/14/2022, 03:22 PM
SAC-Review following site visit	Approved	Administrative Assistant to Provost & VP (Academic)	No		10/12/2022, 10:34 AM

SBC-Review following site visit	Approved	Admin SBC	No	Approved at the October 14, 2022 Senate Budget Committee meeting.	10/15/2022, 10:04 AM
Senate – Phase 1 approval	Approved	Senate Admin	No	Approved at the October 24, 2022 Senate meeting.	10/30/2022, 06:09 PM
Submission of Proposal to Quality Council – Phase 2	Approved	Deputy Provost	No	Approved by Quality Council Friday Dec 16, 2022.	12/19/2022, 12:35 PM
Initiator: Calendar Entry Finalization – Phase 3	Approved	Calendar Entry Finalization	Yes	Please let me know if you have questions. Best regards Wilson Wang	01/06/2023, 02:08 PM
Dean – Phase 3 following QC Approval	Approved	Alicia Madore	No	Approved.	01/09/2023, 12:25 PM
Additional Dean Stage – Business	Approved	David Richards	No	Approved – confirmation received that BUSI course will be funded by Fac Eng.	01/09/2023, 04:53 PM
Additional Dean-Science and Environmental Studies	Approved	SES Admin	No	Approved at FSES Executive Committee Meeting Feb 10, 2023 with the following comment: ENSU 4111 is currently offered only in Orillia. If it needs to be offered in Thunder Bay/Barrie, logistics have to be sorted out.	02/27/2023, 01:38 PM

SUPPORTING DOCUMENTS

File Name	Uploaded By	Upload Date	Size
FINAL Approved by QC Mechatronics Program Proposal Brief_Nov_25_2022.pdf	Deputy Provost	12/19/2022, 12:34 PM	1.33 MB
Mechatronics Program Proposal Brief_Sept 14_2022.pdf	Deputy Provost	09/15/2022, 01:11 PM	2.43 MB
memo_SES support needs re Mechantronics 2021_12_01 TR.pdf	Admin SBC	12/10/2021, 03:15 PM	724 KB
New Program Proposal Brief_Jan 13_2022.pdf	Wilson Wang	01/15/2022, 08:45 AM	2.72 MB

Summary of Changes_Dec 6_2021.pdf	Wilson Wang	01/15/2022, 08:46 AM	306 KB
Summary of Changes_Jan 13_2022.pdf	Wilson Wang	01/15/2022, 08:46 AM	69.7 KB

SUPPORTING DOCUMENTS AUDIT TRAIL

File Name	User	Date	Action
2 Mechatronics Program Proposal Brief_Nov_25_2022.pdf	Deputy Provost	12/19/2022, 12:30 PM	Uploaded
2 Mechatronics Program Proposal Brief_Nov_25_2022.pdf	Deputy Provost	12/19/2022, 12:31 PM	Deleted
3. Mechatronics Program Proposal Brief_July 4_2022.pdf	Administrative Assistant to Provost & VP (Academic)	09/09/2022, 04:17 PM	Uploaded
3. Mechatronics Program Proposal Brief_July 4_2022.pdf	Deputy Provost	09/15/2022, 01:12 PM	Deleted
FINAL Approved by QC Mechatronics Program Proposal Brief_Nov_25_2022.pdf	Deputy Provost	12/19/2022, 12:34 PM	Uploaded
Mechatronics Program Proposal Brief_Sept 14_2022.pdf	Deputy Provost	09/15/2022, 01:11 PM	Uploaded
Memo UG Mechatronics Program Oct 2021.pdf	Wilson Wang	10/31/2021, 09:43 PM	Uploaded
Memo UG Mechatronics Program Oct 2021.pdf	Deputy Provost	11/05/2021, 03:12 PM	Deleted
memo_SES support needs re Mechantronics 2021_12_01 TR.pdf	Admin SBC	12/10/2021, 03:15 PM	Uploaded
New Program Proposal Brief_Jan 13_2022.pdf	Wilson Wang	01/15/2022, 08:45 AM	Uploaded
New Program Proposal Brief_Nov 10_2021 (1).pdf	Deputy Provost	11/11/2021, 12:31 PM	Uploaded
New Program Proposal Brief_Nov 10_2021 (1).pdf	Deputy Provost	11/11/2021, 03:44 PM	Deleted
New Program Proposal Brief_Nov 10_2021_updated.pdf	Deputy Provost	11/11/2021, 03:44 PM	Uploaded
New Program Proposal Brief_Nov 10_2021_updated.pdf	Wilson Wang	01/15/2022, 08:44 AM	Deleted
New Program Proposal Brief_Nov 5_2021 Mechatronics.pdf	Deputy Provost	11/05/2021, 03:13 PM	Uploaded
New Program Proposal Brief_Nov 5_2021 Mechatronics.pdf	Deputy Provost	11/11/2021, 12:31 PM	Deleted
New Program Proposal Brief_Oct 28_2021.pdf	Wilson Wang	10/31/2021, 09:42 PM	Uploaded
New Program Proposal Brief_Oct 28_2021.pdf	Deputy Provost	11/05/2021, 03:12 PM	Deleted
New Program Proposal Brief_Oct 6_2021.pdf	Wilson Wang	10/15/2021, 10:16 AM	Uploaded

New Program Proposal Brief_Oct 6_2021.pdf	Wilson Wang	10/31/2021, 09:42 PM	Deleted
Summary of Changes_Dec 6_2021.pdf	Wilson Wang	01/15/2022, 08:46 AM	Uploaded
Summary of Changes_Jan 13_2022.pdf	Wilson Wang	01/15/2022, 08:46 AM	Uploaded

CHANGE REQUEST COMMENTS

Date	User	Change Request Comment
10/15/2021, 10:20 AM	Wilson Wang	METR Courses - 2021 - ENG - 7793 METR Regulations - 2021 - ENG - 7794

1.	New Program	Bachelor of Engineering (Mechatronics Engineering)
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DEGREE DETAILS**NEW DEGREE/MAJOR PROGRAM FORM**

NOTE TO USER about Quality Assurance requirements

Visit this link to learn about the proposal requirements and the process for review and approval for New Degree/Major Programs.

Note: Revisions to program requirements may be necessary following Quality Assurance review.

The following is information that will be displayed in the University Calendar:

Title of Program: Bachelor of Engineering (Mechatronics Engineering)

Program Requirements:

No.	Year - 1: Fall Term
1	Computer Science 1411 - Computer Programming I
2	Mathematics 1210 - Calculus I
3	Mathematics 1071* - Vectors and Matrices
4	Mechanical Engineering 1731 - Engineering Drawing & Design
5	Engineering 1552** - Engineering Mechanics
6	Mechatronics Engineering 1553 - Materials & Processes
	Total

* Students who have completed Grade 12 U Calculus and Vectors with a minimum grade of 60% are not required to take Mathematics 1071.

**** This course is also offered in the Summer Transition Program as Engineering 3016.**

No.	Year – 1: Winter Term
1	Mechanical Engineering 1635 – Fluid Mechanics
2	Mechatronics Engineering 1011 – Electric Circuits
3	Mathematics 1230 – Calculus II
4	Physics 1212 – Introductory Physics II
5	English 1015 – Introduction to Academic Writing
6	Mechatronics Engineering 1030 – Electronics
	Total

**** This course is also offered in the Summer Transition Program as Engineering 3016.**

No.	Year – 2: Fall Term
1	Mechatronics Engineering 2011 – Microcontrollers & Digital Logic
2	Mathematics 2090 – Matrix Methods & Differential Equations for Electrical Engineers
3	Mechatronics Engineering 2015 – Mechanics of Materials
4	Mechatronics Engineering 2017 – Robotics and Automation I
5	Mechatronics Engineering 2030 – Control Systems
6	Engineering 3015* – Engineering Thermodynamics & Heat Transfer
	Total

*** This course is also offered in the Summer Transition Program and is not required for the Engineering Technology Diploma.**

No.	Year – 2: Winter Term
1	Mechatronics Engineering 2019 – Mechatronics Design I
2	Mechatronics Engineering 2333 – Machine Design
3	Software Engineering 2571 – Computer Hardware & Software Systems
4	Mechatronics Engineering 2434 – Sensors & Measurement
5	Electrical Engineering 2137 – Engineering Probability & Statistics
6	Engineering 3014* – Engineering Chemistry
	Total

** This course is also offered in the Summer Transition Program and is not required for the Engineering Technology Diploma.*

Note: At this point, all students are required to apply to graduate with an Engineering Technology Diploma in Mechatronics Engineering.

No.	Year – 3: Fall Term
1	Mechatronics Engineering 3011 – Actuators and Power Electronics
2	Mechatronics Engineering 3013 – Systems and Signal Processing
3	Mechatronics Engineering 3025 – Robotics and Automation II
4	Mechatronics Engineering 3035 – Object Oriented Programming & Data Structures
5	Sociology 2755* – Technology, Society & Indigenous Peoples in Canada
6	** One Complementary Studies Elective Course
	Total

** The Indigenous Content requirement is met by taking Sociology 2755, a Type E course. This course may be taken at any time in the 3rd or 4th year of the program.*

No.	Year – 3: Winter Term
1	Electrical Engineering 3312 – Embedded Systems
2	Mechatronics Engineering 3017 – Mechatronics Design II
3	Mechatronics Engineering 3451 – Kinematics & Dynamics of Machines
4	Software Engineering 3558 – Numerical Methods & Modeling
5	Engineering 3336 – Engineering Economics & Project Management
6	** One Complementary Studies Elective Course
	Total

No.	Year – 4: Fall Term
1	Mechatronics Engineering 4013: Big Data & Cloud Computing
2	Mechanical Engineering 4436 – Mechanical Vibrations
3	Business 5035 – Corporate Innovation and Entrepreneurship
4	Environment Sustainability 4111: Materials, Manufacturing & Waste
5	Mechatronics Engineering 4969 – Degree Project
6	Elective Course I
	Total

No.	Year – 4: Winter Term
1	Electrical Engineering 4137 – Computer Networking
2	Engineering 4539 – Professional Practice and Law
3	Mechatronics Engineering 4969 – Degree Project

4	Elective Course II
5	Elective Course III
6	** One Complementary Studies Elective Course
	Total

*** Complementary Studies electives must be selected from the approved list of courses in the Faculty of Engineering.*

Co-op Work Terms

Co-operative Education is a mandatory component of the BEng Mechatronics Engineering program. Students in BEng Mechatronics Engineering program are required to complete at least one Co-operative Education term in industry. It aims to integrate classroom study with workplace experience. The following summaries the co-operative work term requirements:

No.	Co-operative Work Terms	Hours
1	Work 2990 – Mechatronics Co-op Work Term 1	560
2	Work 3991 – Mechatronics Co-op Work Term 2	560
3	Work 4991 – Mechatronics Co-op Work Term 3	560
	Total Hours	1680
	Minimum Hours	560

Elective Courses

Mechatronics Engineering students will normally select their engineering elective courses from the following list:

- Computer Science 4313: Programming & the Internet of Things
- Electrical Engineering 4054 – Digital VLSI Circuit Design
- Mechanical Engineering 0537 – Manufacturing Processes and Production Systems
- Software Engineering 0153 – Natural Language Processing
- Software Engineering 4011 – Applied Computational Intelligence
- Mechatronics Engineering 0538 – Special Topics in Mechatronics Engineering

New courses and new elective courses will be added to the Mechatronics Engineering Program following the general approval procedures. If a new course is proposed by the Mechatronics Engineering Program, after relevant approval by the department chair and Faculty Council, it will be forwarded to the Lakehead

University Senate Undergraduate Studies Committee for approval.
It will be followed by the approval by the Lakehead University Senate.

The following is information for Committee Review:

Program Code (Contact Academic & Curriculum Development Coordinator for New Code): BENG DIP.METR

Calendar Start Term. When this change should be displayed in the Calendar: 2022-23

Calendar End Term. When is the last calendar year this should be displayed?: No Specified End Date

Faculty or Institution Unit: • Lakehead University

Academic Level: Undergraduate

If this a graduate level program, select either PhD or Masters:

Degree Type: BENG

The second review phase involves submission of the proposal brief (see link above for more information). Is the program proposal attached?: Yes

Transcript Title : Bachelor of Engineering (Mechatronics Engineering)

Pedagogical rationale for this proposal. Why are you submitting this request?: The submitted request is to develop an interdisciplinary undergraduate program: Mechatronics Engineering. With the global thrust in automation and computer-assisted technologies, there is a growing demand for a program at the intersection of Mechanical, Electrical and Software Engineering, and Computer Science. The Mechatronics Engineering nicely meets this need. On the other hand, there is a significant societal push within the Province of Ontario and across Canada to create sustainable technologies and meet the United Nations' Sustainable Development Goals. Therefore, sustainable design is critical for providing economic growth, protecting the environment, and improving the well-being of people and society. This creates an extraordinary opportunity to offer a new program that considers sustainability at its core, and provides technical knowledge in the intersecting domain of mechanical and electrical engineering, the electromechanical systems. This program would also incorporate business, law, and public safety into its foundation. On the other hand, from market demand analysis, it is predicted that there would be an exponential growth of jobs related to Mechatronics Engineering over the next 5 to 10 years. Offering a program that intersects with key labor market drivers would be a very attractive proposition for those who wish to pursue post-secondary studies in Ontario.

Associated Changes – List all other requests that are associate with this change (enter request number or title):

The admission requirements will be the same as those in the existing Engineering Programs such as Mechanical, Electrical and Software Engineering. The program requirements of the new Mechatronics Engineering will be the same as those in the existing Engineering programs, except that each student must take at least one Co-op term related to Mechatronics Engineering. The new Mechatronics Engineering program will have 17 new courses. The Change of Request Number for these new courses is: 2021-ENG-7793. Students will take other courses from the existing programs such as Mechanical, Electrical and Software Engineering, and Computer Science. The associated regulation change request number is: 2021-ENG-7794.

The following is information for Senate Budget Committee Consideration:

NOTE: Complete each section and provide full explanations for both "yes" and "no" answers. This will not be displayed in the calendar but will be used by the Senate Budget Committee when considering approval of this proposal. The creator of this proposal may be asked to attend a committee meeting to discuss this proposal. Contact the Chair of the Senate Budget Committee if you wish to discuss any of the questions below.

Will this program impact student enrolment in another program within the same faculty/unit?:

No. It is a new interdisciplinary undergraduate program related to Mechanical, Electrical and Software Engineering, as well as Computer Science. In general, if an applicant is applying for the Mechatronics Engineering (either at Lakehead University or at other universities), the student would not apply for a specific traditional Engineering program such as Mechanical, Electrical, Software Engineering.

Will this program impact student enrolment in another program in a different faculty/unit?:

No. It is a new interdisciplinary program in the Faculty of Engineering.

Will additional resources be required (space, staff, equipment, etc.)?:

Yes. As a new undergraduate program, it requires recruitment of three new faculty members and one new technologist. Details please see from the Proposal Brief. New lab spaces are required for two new labs for the courses: Mechatronics Design, Robotics and Automation. New equipment will also be required for these two new labs.

How will this impact existing teaching loads within this faculty/unit?:

Three new faculty members will be recruited to teach these new courses. There is no direct impact on the existing teaching loads within the Faculty of Engineering, except the increase of number of students in the related courses.

What is the impact on the demand for teaching support services (library, computers, staff, etc.)?:

Extra computers are required for new labs. As stated before, one technologist will be recruited to support the related lab work. No extra library sources are required for this new Mechatronics Engineering program.

Will this require outside support? If yes, please outline the amount and timing of the funding:

N/A

2.	New Program	Engineering Technology Diploma
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DEGREE DETAILS**NEW DEGREE/MAJOR PROGRAM FORM**

NOTE TO USER about Quality Assurance requirements

Visit this link to learn about the proposal requirements and the process for review and approval for New Degree/Major Programs.

Note: Revisions to program requirements may be necessary following Quality Assurance review.

The following is information that will be displayed in the University Calendar:

Title of Program: Engineering Technology Diploma

Program Requirements:

The Mechatronics Engineering Technology Program consists of the Common Year in Applied Science, or equivalent, plus the first two years of the Bachelor of Mechatronics Engineering Degree Program with the exception of Engineering 3014 – Engineering Chemistry, which is not included.

The following is information for Committee Review:

Program Code (Contact Academic & Curriculum Development Coordinator for New Code): ENG DIP.METR

Calendar Start Term. When this change should be displayed in the Calendar: 2022–23

Calendar End Term. When is the last calendar year this should be displayed?: No Specified End Date

Faculty or Institution Unit: • Lakehead University

Academic Level: Undergraduate

If this a graduate level program, select either PhD or Masters:

The second review phase involves submission of the proposal brief (see link above for more information). Is the program proposal attached?: Yes

Transcript Title :

Pedagogical rationale for this proposal. Why are you submitting this request?: The submitted request is to develop an interdisciplinary undergraduate program: Mechatronics Engineering, at both the Thunder Bay and Barrie campuses. With the global thrust in automation and computer-assisted technologies, there is a growing demand for a program at the intersection of Mechanical, Electrical and Software Engineering, and Computer Science. The Mechatronics Engineering nicely meets this need. On the other hand, there is a significant

societal push within the Province of Ontario and across Canada to create sustainable technologies and meet the United Nations' Sustainable Development Goals. Therefore, sustainable design is critical for providing economic growth, protecting the environment, and improving the well-being of people and society. This creates an extraordinary opportunity to offer a new program that considers sustainability at its core, and provides technical knowledge in the intersecting domain of mechanical and electrical engineering, the electromechanical systems. This program would also incorporate business, law, and public safety into its foundation. On the other hand, from market demand analysis, it is predicted that there would be an exponential growth of jobs related to Mechatronics Engineering over the next 5 to 10 years. Offering a program that intersects with key labor market drivers would be a very attractive proposition for those who wish to pursue post-secondary studies in Ontario.

Associated Changes – List all other requests that are associate with this change (enter request number or title):

The admission requirements will be the same as those in the existing Engineering Programs such as Mechanical, Electrical and Software Engineering. The program requirements of the new Mechatronics Engineering will be the same as those in the existing Engineering programs, except that each student must take at least one Co-op term related to Mechatronics Engineering. The new Mechatronics Engineering Technology Program will have 10 new courses. The Change of Request Number for these new courses is: 2021-ENG-7793. Students will take other courses from the existing programs such as Mechanical, Electrical and Software Engineering, and Computer Science. The associated regulation change request number is: 2021-ENG-7794.

The following is information for Senate Budget Committee Consideration:

NOTE: Complete each section and provide full explanations for both "yes" and "no" answers. This will not be displayed in the calendar but will be used by the Senate Budget Committee when considering approval of this proposal. The creator of this proposal may be asked to attend a committee meeting to discuss this proposal. Contact the Chair of the Senate Budget Committee if you wish to discuss any of the questions below.

Will this program impact student enrolment in another program within the same faculty/unit?:

No. It is a new interdisciplinary undergraduate program related to Mechanical, Electrical and Software Engineering, as well as Computer Science. In general, if an applicant is applying for the Mechatronics Engineering (either at Lakehead University or at other universities), the student would not apply for a specific traditional Engineering program such as Mechanical, Electrical, Software Engineering.

Will this program impact student enrolment in another program in a different faculty/unit?:

No. It is a new interdisciplinary program in the Faculty of Engineering.

Will additional resources be required (space, staff, equipment, etc.)?:

Yes. As a new undergraduate program, it requires recruitment of three new faculty members and one new technical support staff at both the Thunder Bay and Barrie campuses. Details please see from the Proposal Brief. New lab spaces are required for two new labs for the courses: Mechatronics Design, Robotics and Automation. New equipment will also be required for these two new labs. (At the initial stage, we will use virtual labs and research labs for the related

experiments).

**How will this impact
existing teaching loads
within this faculty/unit?:**

Three new faculty members will be recruited at each campus to teach these new courses. There is no direct impact on the existing teaching loads within the Faculty of Engineering, except the increase of number of students in the related courses.

**What is the impact on the
demand for teaching
support services (library,
computers, staff, etc.)?:**

Extra computers are required for new labs. As stated before, one technologist will be recruited to support the related lab work. No extra library sources are required for this new Mechatronics Engineering program.

**Will this require outside
support? If yes, please
outline the amount and
timing of the funding:**

N/A