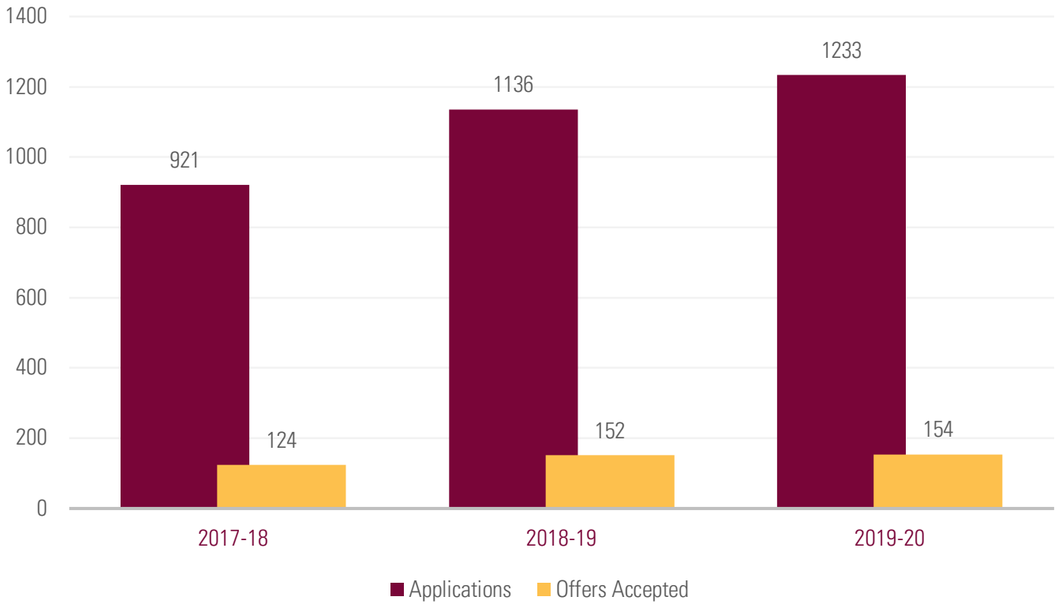
McMaster University | Integrated Biomedical Engineering & Health Sciences Program

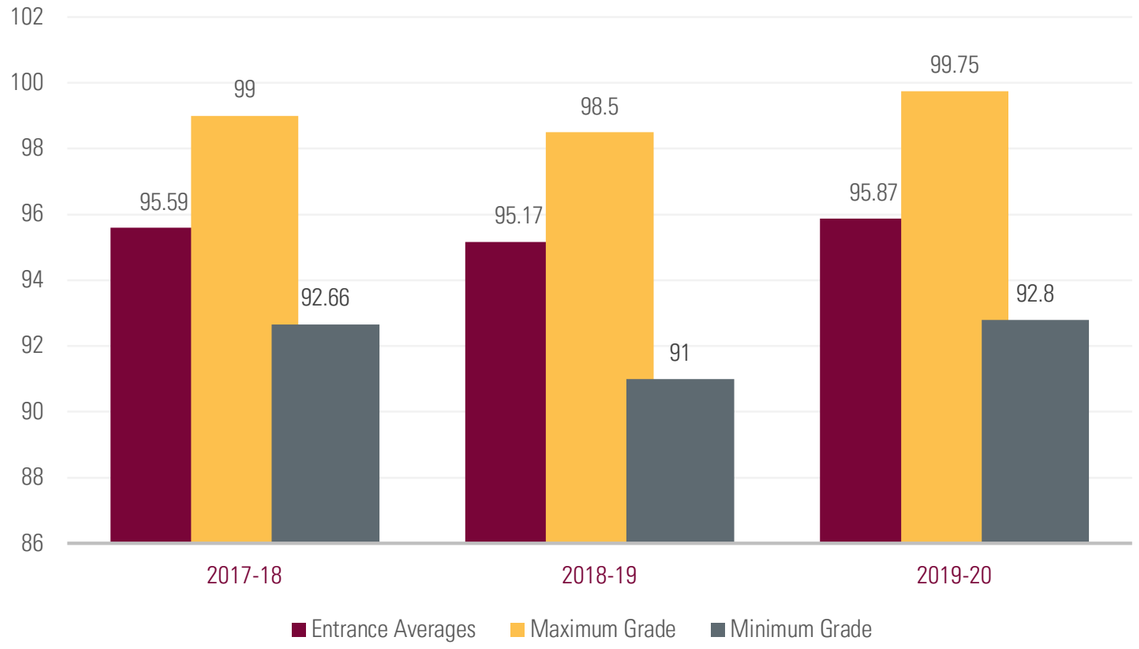
2019-20 ANNUAL REPORT

BRIGHTER WORLD | McMaster University

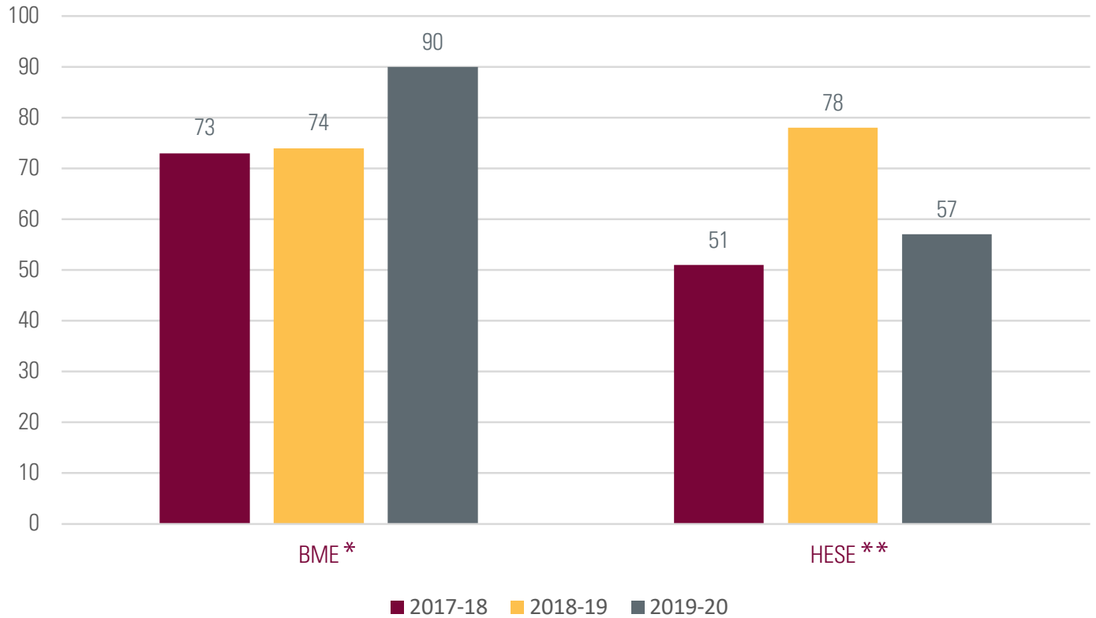
Applications & Admissions



Student Quality: Entrance Averages

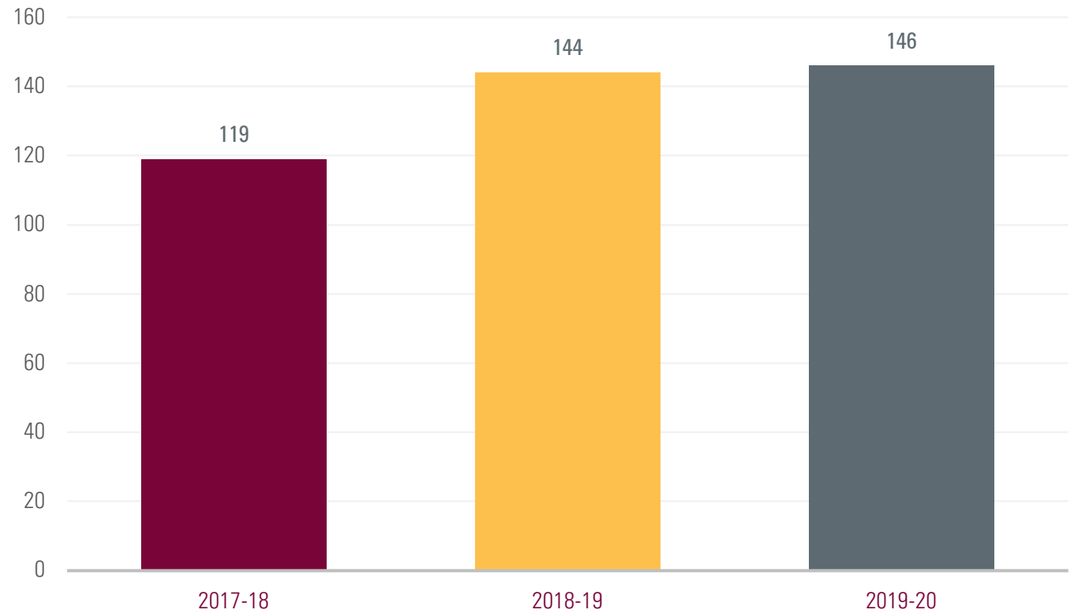


Subject of Major Interest Upon Entrance

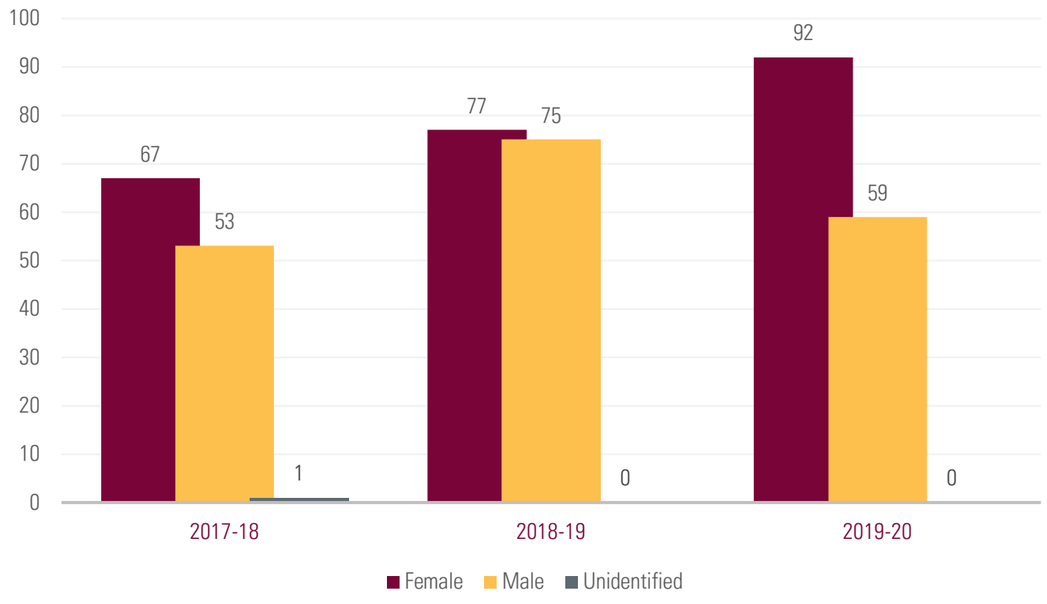


*Biomedical Engineering
**Health, Engineering Science & Entrepreneurship

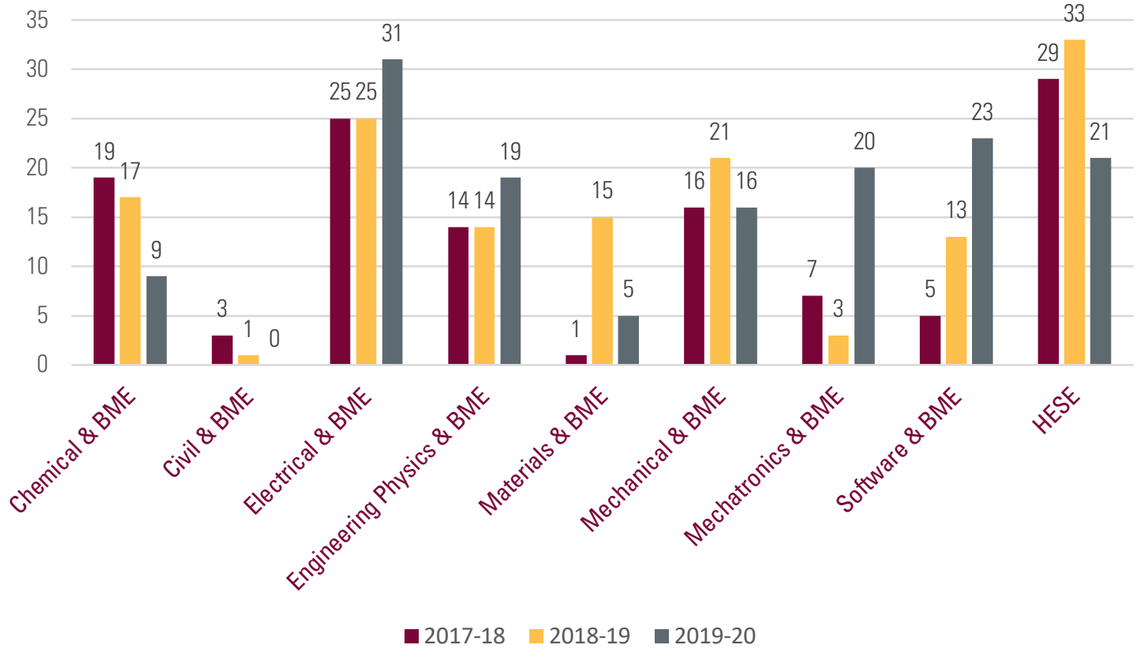
Undergraduate Enrolment Headcounts



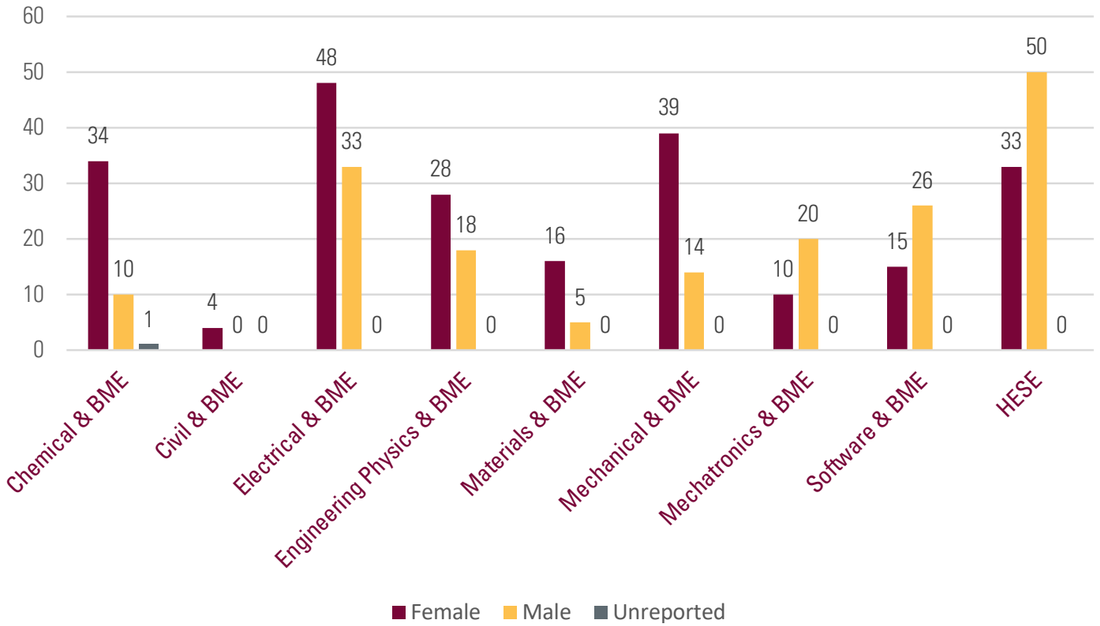
Women in iBioMed



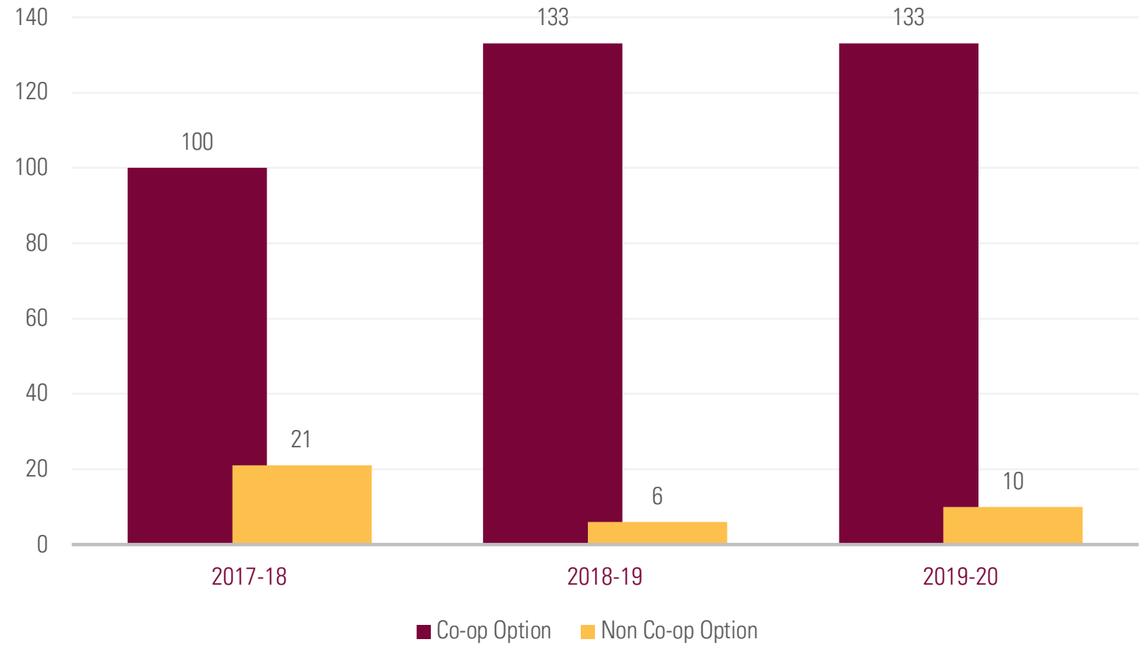
Level II Program Allocation



Undergraduate Students Gender Numbers by Program



IBEHS Co-op Program Selection



NOTE:
This graph includes data from the 2017-18, 2018-19 and 2019-20 academic terms.

Student Achievements

SEPTEMBER 2019 - The iBioMed program was represented at MedHacks at John Hopkins University (JHU) in Baltimore, Maryland. iBioMed students consisted of both first-years and upper-years.

OCTOBER 2019 - Hosam Abdel Hafeez, Taha Parvez and Vikash Nanthakumar, third-year HESE students, were accepted into The Forge Business Incubator with their startup AIRefer, a centralized medical referral system.

160

Number of iBioMed students that made the Deans' Honour List

5

Number of iBioMed students that made the Provost Honour Roll (all HESE students)

1

Number of iBioMed students accepted into medical school*

JANUARY 2020 - Andrew D'Elia, second-year Materials & BME student, published work in "Colloids and Surfaces B: Biointerfaces," an international journal devoted to the medical, pharmaceutical, biotechnological, food and cosmetic fields.

MARCH 2020 - Lianna Genovese, third-year Mechanical & BME student, won second place at the annual Forge Student Startup Competition. Lianna took home the second place prize of $11,000 for her startup, ImaginABLE Solutions.

MAY 2020 - Arjun Raghavan (HESE) is the first iBioMed student to receive an exit degree (Bachelor of Health Sciences) after being accepted into medical school. Arjun will study medicine at The University of Manitoba.

*This is the first eligible student of the iBioMed program to be accepted into Med School.

iBioMed Community Comes Together During COVID

The COVID-19 pandemic didn't stop the iBioMed community from banding together. Over the course of just a few weeks, both students and faculty came together to create Personal Protective Equipment (PPE) solutions for healthcare workers.

iBioMed Students from various programs and backgrounds collaborated on innovative solutions. From HESE to Electrical, Engineering 1 and Nursing, the iBioMed community showed it's ready to step up to any challenge!

iBioMed saw an Electrical and BME student, along with her Nursing student sister, create a possible alternative to an N95 respirator. Likewise, the 3D printers in iBioMed's Design Studio were used to create PPE for Healthcare workers.

The iBioMed program is proud to be a part of this forward-thinking and innovative community!

APRIL 2020 - Third-year HESE student John Milkovich, along with his brother Matthew, created a do-it-yourself PPE respirator. Their design was inspired by a particular snorkel mask they found on a trip to Croatia.

APRIL 2020 - Initiated by Tim Hillson, assistant clinical professor of surgery in the faculty of health sciences, iBioMed's Design Studio was used by Dr. Mike Noseworthy and his son Alec Fernback (Engineering 1) to create face shields.

APRIL 2020 - iBioMed student Amanda Tomkins (Electrical & BME), along with her sister, a nursing student at Georgian College, designed a mask that could potentially be used in place of an N95 respirator.

iBioMed Society Highlights

IBIOBUDS MENTORSHIP PROGRAM STILL GOES STRONG (OCTOBER 2019)

In October 2018, the iBioMed Society officially launched its iBioBuds Mentorship Program. This past academic year was no different as upper-year iBios connected with first-years helping them transition into university and iBioMed life!

IBIOMED SOCIETY CO-HOSTS INDUSTRY NIGHT (JANUARY 2020)

This past January, 10 companies, 300 students and 3 student groups came together for the Biomedical, Bioengineering and Biotechnology Industry Night.

LIFE AFTER IBIOMED EVENT (FEBRUARY 2020)

This event brought together a panel of industry experts that answered questions about education, student life and career paths.

Panelists included:

Dr. Nicholas Valetta, Interventional Cardiologist, Michael G. DeGroote School of Medicine

Dr. Greg Wohl, Professor, Department of Mechanical Engineering

Representative from University of Toronto's MD Program, McMaster Electrical & Biomed Program Alumna

Project Highlights

From clinical placements to keeping drivers awake behind the wheel and combating opioid overdoes, iBioMed students showed they have what it takes to develop creative solutions to real world health care problems.

For IBEHS 1P10's Design Project 3, first-year students designed tracking and monitoring devices to create innovative health care solutions.

Likewise, in **IBEHS 2P03,** second-year iBioMed students used genetic engineering to tackle challenging problems.

And in **IBEHS 3P04,** third-year iBioMed students shared some solutions relating to knee replacement surgery and lumbar spinal stenosis.

iBioMed's **HESE program** saw Dr. Sean Park (2E06) take students out of the classroom and into the museum to learn about design thinking, and Dr. Anna Korol (3E06) spearheaded Innovators in Scrubs, an initiative that provides third-year HESE students clinical placements within Hamilton Health Sciences and St. Joseph's Healthcare.

Danger Zone

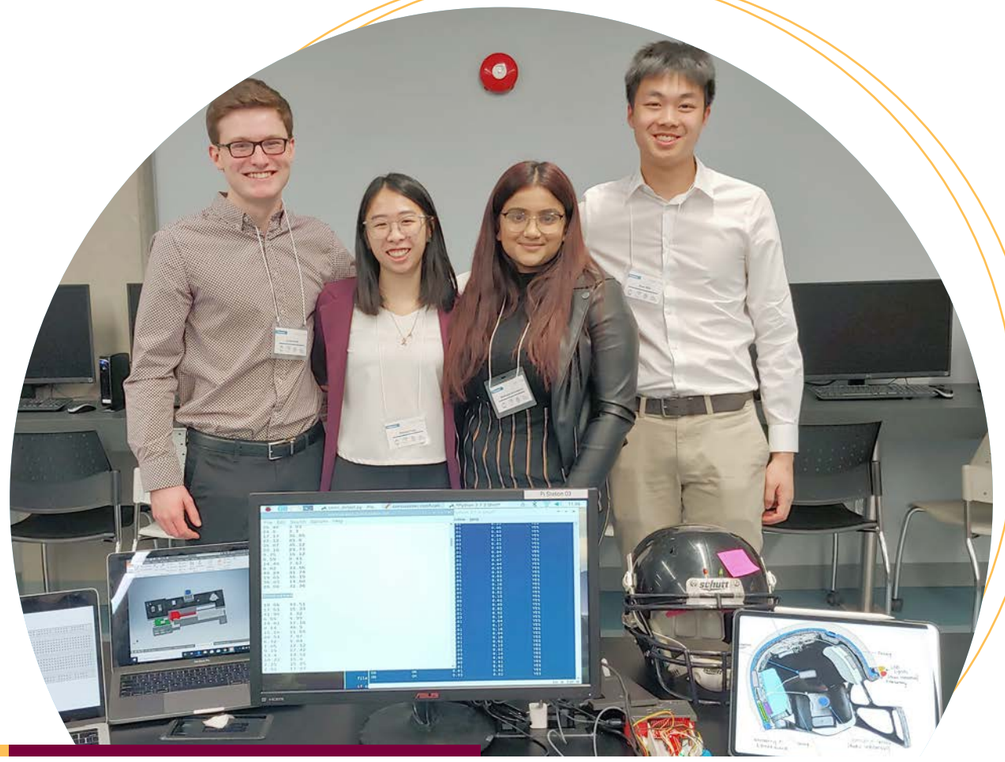
PORTABLE GAS-MONITORING DEVICE (IBEHS 1P10- DESIGN PROJECT 3)

Inspired by this year's Australian fires, this team created a gas monitor that is cost-effective, user-friendly and portable. Their device, Danger Zone, was crafted around the idea that anyone can use it. It requires very little training, making it easy to learn and use in a dangerous situation.

Stayin' Alive

DRIVER ALERTNESS MONITOR (IBEHS 1P10- DESIGN PROJECT 3)

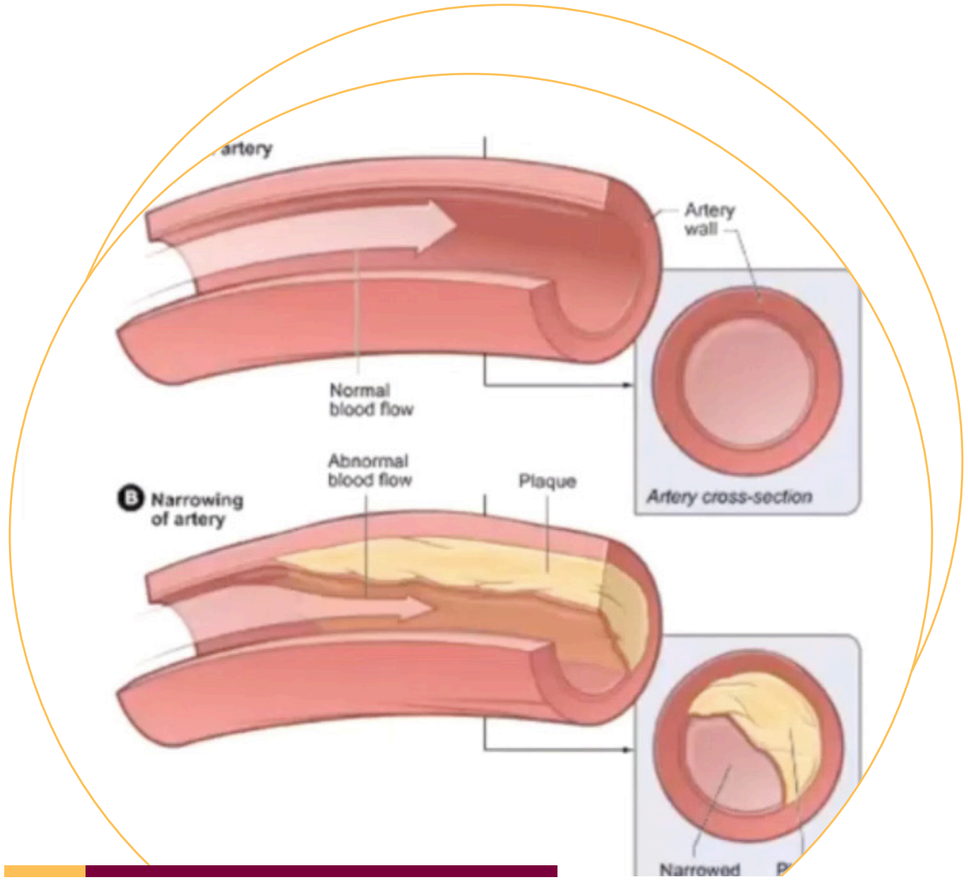
The number of collisions caused by driver fatigue was this team's inspiration. This device is a band that is attached to the driver's hand, and it periodically gives off slight vibrations. Once the driver feels the vibration, they have a certain amount of time to indicate their alertness by squeezing the band and steering wheel. If there's no response from the driver, an alarm will sound alerting the driver.



Concussion Helmet

FOOTBALL HELMET COMMUNICATES HEAD INJURIES (IBEHS 1P10- DESIGN PROJECT 3)

This team took inspiration during Superbowl season and created a concussion helmet for football players. It measures the whiplash motion associated with being hit. When struck, one of two LED lights on the front of the helmet light up indicating the level of injury and if the player has sustained, or is in threat of sustaining, a concussion.



Auto C.A.D. Coronary Artery Disease

A NOVEL DESIGN FOR THE TREATMENT OF ATHEROSCLEROSIS (IBEHS 2P03)

Students designed a treatment for Coronary Artery Disease with synthetic biology by elevating the body's natural process for dissolving blood clots to clear the arteries.

Combating Opioid Overdoes

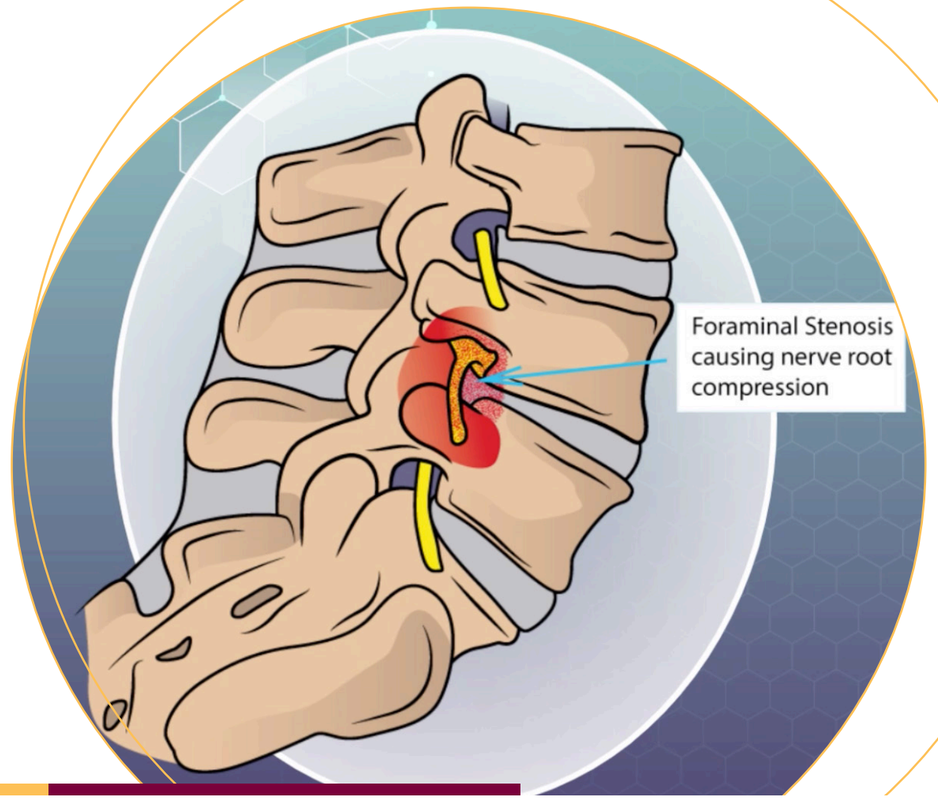
PROLONGING THE EFFECTS OF NALOXONE (IBEHS 2P03)

By using synthetic biology, enzymes that prevent the degradation of Naloxone (the most common way to reverse overdose affects) can be manipulated to prolong Naloxone's effects and reduce the need for multiple dosages.

Total Knee Replacement

PRIORITIZING COMFORT AND CONVENIENCE AFTER A TOTAL KNEE REPLACEMENT (IBEHS 3P04)

This team set out to find a way to monitor dynamic knee joint movement in rehabilitation following aTKA (total knee athroplasty).This included considering movement in multiple dimenions, using a 9-axis Inertial Measurement Unit (IMU) to find a joint angle and priorotizing comfort and convenience.



Lumbar Spinal Stenosis

USING A REMOTE GAIT MONITORING SYSTEM AS PART OF TREATMENT (IBEHS 3P04)

This team aimed to design a system that not only gathered postural data, and displayed it, but could analyze gait and postural swaying with potential training exercizes that could help the patient recover from post-surgery symptoms.

HESE Partners with the McMaster Museum of Art

SECOND-YEAR HESE STUDENTS WHERE PROVIDED OUTSIDE-THE-BOX APPROACH TO LEARNING (IBEHS 2E06)

Dr. Sean Park, in collaboration with third-year HESE student, Raymond Tolentino, partnered with the McMaster Museum of Art to develop a workshop introducing STEAM (Science, Technology, Engineering, Art and Mathematics). The goal with this interactive workshop was to help students strengthen their skills in observation, communication, creative thinking and empathy through art.

HESE Students' Clinical Placements

INNOVATORS IN SCRUBS GAVE THIRD-YEAR HESE STUDENTS HANDS-ON EXPERIENCE (IBEHS 3E06)

Innovators in Scrubs, spearheaded by Dr. Anna Korol, provides fresh eyes on healthcare challenges. Third-year HESE students teamed up with clinical leads at Hamilton Health Sciences and St. Joseph's Healthcare Hamilton. Students could be found in Cardiology, Perioperative Care, Radiology, Emergency and Nephrology.

Learn more about HESE by checking out Dr. Korol and Dr. Park's HESE video on our YouTube: https://www.youtube.com/watch?v=pnOfZVc1TBU&t=13s

iBioMed Enhancements

IBEHS 2P03 MATLAB SIMBIOLOGY

Students purchased this themselves and were taught how to design synthetic biological circuits and model / simulate it on MATLAB using the SimBiology toolbox.

IBEHS 3P04 ESP32 DEVELOPMENT BOARDS

Students already have experience using Raspberry Pis, low-cost single-board computers, which are programmed in Python, and this past academic year in 3P04, students were taught how to use ESP32 microcontrollers / ESP32 Development Boards. There are very low-powered, small and low-cost but simple computers, programmed in Arduino / C++. These types of computers are used in wearables, smart or WiFi or Bluetooth-connected devices and more. These are very useful for rapid prototyping!

IBEHS 3P04 AUXILIARY EQUIPMENT

While this equipment is related to 3P04 Design Project testing, it can also be applied to many other student projects and courses as well.

Some new auxiliary equipment includes:

- Balance boards
- Goniometers
- IR laser thermometers
- Body weight scale
- Resistance bands
- and more!

One of the most **amazing parts about iBioMed** is that it never stops updating the technology it provides. iBioMed is updating its sensors with the **latest releases** basically ever year.

Parm Bola, Instructional Assistant

IBEHS 1P10 / 3P04 NEW SENSORS

New sensors purchased in bulk are:

- "BNO055" Orientation Sensor (this can be used in Drones, Virtual Reality headsets, and other motion-tracking related products to detect the orientation of the device in space)
- "Grove" Multi-channel gas sensors (to detect concentrations of multiple gases at once)
- "AMG8833" IR thermal array (the sensor that provides thermal images for items like thermal cameras)
- "VL53L0X" time of flight distance sensors and pulse / heart beat sensors

MATLAB

iBioMed aquired classroom concurrent license for 10 licenses

FURNITURE

New furniture for iBioMed's new Design Studio space in ABB

NEW LABS

In the process of setting up new Medical Imaging and Instrumentation labs in ETB 533 and 534

New Design Studio

iBioMed opened its new Design Studio in ABB this year!

Design Studio Highlights

- HandTools Station
- Prototyping Station
- Sewing Station
- Electronics Prototyping Cabinet
- Sensors
- Soldering Station
- 3D Printers

Equipment in iBioMed's new Design Studio was used to create Personal Protective Equipment (PPE) for healthcare workers during COVID-19.

Recruitment

- Collaboration with Engineering Recruitment, Central Recruitment and FHS to plan and host events throughout the academic year
- Specialized tours tailored to prospective iBioMed students
- New "Pen Pal-Style" program that connects prospective students with current students. Students determine platforms used (text, email, phone etc.)
- Ambassadors and the iBioMed Society act as the main sources of information at recruitment events such as OUF, Fall Preview, Information Nights, May@Mac, Engineering 1 / iBioMed 1 Info Fair etc.
- Multiple iBioMed student Instagram takeovers. These takovers were directed toward prospective students, and opportunities were provided for prospective students to engage with current students and ask questions.
- iBioMed Ambassadors, faculty and staff participated in Engineering's Virtual Open House (in leiu of May@Mac)

Recruitment Events

SEPTEMBER
Ontario Universities Fair (OUF)

OCTOBER
Fall Preview #1

NOVEMBER
Fall Preview #2

FEBRUARY / MARCH
Engineering 1 / iBioMed Info Fair
iBioMed Virtual Info Nights

MAY
Engineering's Virtual Open House

Marketing & Communications

Social Media Growth

*LinkedIn account created for the first time during 2019-20 academic term
**No YouTube data recorded for 2017-18 and 2018-19

iBioMed **student Instagram** takeovers have helped our audience grow to over **1000 followers!**

HIGHLIGHTS

- Creation of new iBioMed LinkedIn page. This page is being used to increase awareness about the program, specifically to industry, and will also be used to maintain relationships with alumni
- Increase in boosted posts on Facebook and Instagram is resulting in new followers and increased engagement
- Multiple student Instagram takeovers have contributed to large increase in followers
- New video content for iBioMed YouTube channel is helping to grow our subscribers. In addition, re-sharing videos to coincide with certain times of the year has also helped increase engagement, followers and exposure of the iBioMed Program.

Events

MONTHLY THEMED OPEN HOUSES

This past academic year marked the introduction of iBioMed's monthly themed open houses.
This engagement initiative invites iBioMed students, faculty and staff to the iBioMed main office in a drop-in format. Light snacks and refreshments are provided, and students have the opporunity to connect with their peers and members of the iBioMed team.

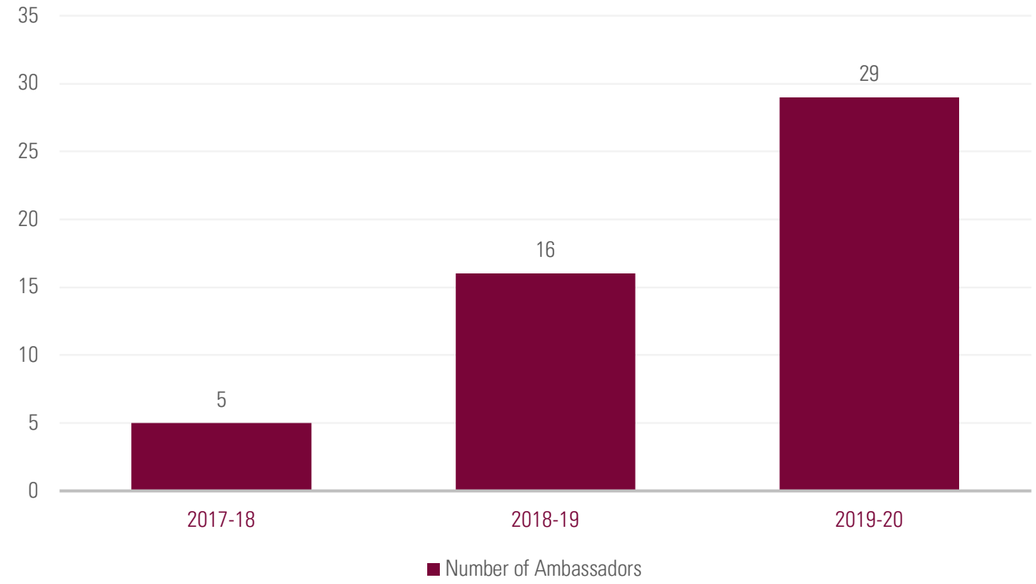
IBIOMED CONNECT

Inspired by feedback from student satisfaction surveys, iBioMed introduced iBioMed CONNECT, a week-long summer skills workshop. This kicked off in August 2019, and included workshops in MATLAB, Raspberry Pi, Python, a 3MT-style workshop, an introduction to library resources and more!

IBIOMED VIRTUAL INFO SESSIONS

Although iBioMed's Info Night was cancelled due to COVID-19, upper-year iBioMed students were determined to help out first-year iBios.
This student-lead series of Info Sessions invited first-year students to attend and ask questions about each stream option. There were 9 individual virtual info sessions in total- one for each stream!

iBioMed Ambassador Program



WHERE CAN YOU FIND OUR AMBASSADORS?

- Ontario Universities Fair
- Fall Preview
- Engineering 1 & iBioMed 1 Information Fair
- May@Mac
- iBioMed campus tours
- Connecting with prospective students - iBioMed and the Faculty of Engineering have a pen-pal style program that allows prospective students to connect with current students one-on-one.
- Social media - Many of our ambassadors can be seen on our Instagram channel doing social takeovers where they share the student experience. Look out for our ambassadors on our YouTube channel too; iBioMed Ambassadors can be seen in our program videos, and some have created their own videos about their chosen streams.
- iBioMed's website - Did you know our ambassadors are writers too? Many iBioMed Ambassadors have written articles about the student experience and their streams.

iBioMed Family Updates

DR. HUBERT DE BRUIN STEPS DOWN AS IBIOMED CO-DIRECTOR (BME)

Dr. Hubert De Bruin stepped down as iBioMed Co-Director as of June 30, 2020.The iBioMed team would like to thank Dr. de Bruin for his unwavering leadership and support.

IBIOMED WELCOMES DR. GREG WOHL AS NEW IBIOMED CO-DIRECTOR (BME)

The iBioMed program is excited to welcome Dr. Greg Wohl as its new Co-Director for BME as of July 1, 2020. Dr. Wohl was instrumental in the development of the iBioMed program and has since continued to be a strong advocate of the program greatly influencing its ongoing progress.

DR. COLIN MCDONALD NAMED ASSOCIATE DIRECTOR (BME) OF THE IBIOMED PROGRAM (ENGINEERING) AND WINNER OF PRESTIGIOUS TEACHING AWARD

This past October, the iBioMed Progam welcomed Dr. Colin McDonald as the new Associate Director (BME) of the iBioMed Program, Faculty of Engineering. In August 2020, Dr. McDonald was the recipient of the MacPherson 2020 President's Award for Outstanding Contributions toTeaching and Learning.

DR. ALEX DROSSOS NAMED ASSOCIATE DIRECTOR OF THE IBIOMED PROGRAM (HEALTH SCIENCES)

This past year, the iBioMed Progam welcomed Dr. Alex Drossos as the new Associate Director of the iBioMed Program, Faculty of Health Sciences.

Contact Us!

https://www.instagram.com/macibiomed/

https://www.youtube.com/channel/UCFu54PgzoKpZtyC5Tc9XbQg

https://www.linkedin.com/company/ibiomed-mcmaster-university/

https://www.facebook.com/MaciBioMed

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McMaster University

Integrated Biomedical Engineering & Health Sciences Program

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