STEM COLLEGIATE EDMONTON

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MIT BWSI Courses at STEM Collegiate!

The MIT 'Beaver Works Summer Institute' (BWSI) is a rigorous, world class STEM program developed by MIT Lincoln Laboratory and the MIT School of Engineering. Designed for talented high school students, BWSI empowers youth to tackle complex engineering challenges and prepares them for advanced studies in science and technology.

STEM Collegiate (together with our sister school STEM Innovation Academy in Calgary) are proud to be the only schools in Canada to integrate MIT BWSI course material directly into our high school curriculum.

Please see how we plan to integrate MIT BWSI courses into our unique STEM curriculum:

Phase 1 – 2025/26

Robotics 25 – Autonomous Vehicles for Disaster Relief / MIT (BSWI) - Autonomous Race Car
Students will take their robotics skills to the next level with *Robotics 25*, where smart machines meet real-world systems. In this course, students will deepen their understanding of automation, process control, and how robotics power modern industry. They will explore advanced robotic platforms, develop precision programming skills, and integrate sensors to create increasingly intelligent systems.

These skills come together in a capstone project inspired by MIT's Beaver Works Summer Institute: Creation of an autonomous vehicle equipped for Disaster Relief. In this project, students will engineer agile robots with advanced sensors to detect victims, navigate complex environments, and respond to real-world challenges.

Those seeking an extra challenge may adapt their build for entry into the annual MIT-hosted autonomous race!

With a focus on innovation, technical mastery, and real-world problem-solving, students will think bigger, build smarter, and prepare for a future driven by intelligent systems.

Prerequisites: Robotics 15

Computer Science 25/ MIT BSWI - Autonomous Cognitive Assistant

Time to take your coding skills to the next level with *Computer Science 25*, where students dive deeper into problem-solving, data structures, and procedural programming techniques as they tackle real-world coding challenges.

Students will explore a second programming language to expand their versatility, all the while preparing for careers in software development, AI, game design, and more.

Complimenting these skills, students will engage with MIT's Beaver Works Summer Institute's "Autonomous Cognitive Assistant" module, exploring foundational concepts in modern machine learning, including neural networks, natural language processing, and computer vision.

Through project-based learning, they will develop intelligent systems capable of interpreting and responding to real-world data inputs.

The course culminates in an advanced capstone project where students bring their ideas to life through thoughtful design and efficient code, perhaps augmented with what they learned from BWSI. Build smarter, code cleaner, and shape the future—one program at a time.

Prerequisites: Computer Science 15

Introduction to Artificial Intelligence 15 / MIT BWSI - Medlytics

Step into the world of artificial intelligence in *Intro to Artificial Intelligence 15*, where you'll begin to explore how machines learn, think, and make decisions. This beginner-friendly course introduces the core concepts behind artificial intelligence—like algorithms, data sets, neural networks, and machine learning—through hands-on activities, games, and simulations. Students will examine how AI is already shaping our world, from social media to smart assistants, and debate its growing influence on privacy, work, and society.

Building on these foundations, students will engage with MIT's Beaver Works Summer Institute's Medlytics module, applying AI to real-world medical challenges. Through project-based learning, students will analyze physiological signals and time-series data, gaining insights into how AI can assist in diagnostics and healthcare solutions.

Whether you're coding a basic chatbot or analyzing how AI makes recommendations, this course builds the essential skills and ethical awareness to be an informed digital citizen in the age of artificial intelligence.

Prerequisite: None, but Programming experience is an asset!

Phase 2 – 2026/27

Computer Science 35 / MIT BWSI – Serious Games with AI
Push your programming skills to a professional level in *Computer Science 35*, where advanced logic meets software design. You'll dive into object-oriented programming and create modular, scalable programs that reflect real-world applications. Learn how modern software is built—from classes and inheritance to reusable code and clean architecture.

Building on these foundations, students will engage with MIT's Beaver Works Summer Institute's "Serious Games with AI" module, exploring how artificial intelligence can be applied to game design. This includes understanding systems modeling, backend development, and the ethical considerations of AI in gaming contexts. Through project-based learning, students will develop intelligent systems capable of interpreting and responding to real-world data inputs.

This course challenges you to think like a developer, build with intention, and explore complex systems through hands-on problem-solving. Finish your journey with a major independent project that showcases everything you've learned. Whether you're planning a future in tech or just love the thrill of creating, this is your launchpad to what's next.

Prerequisite: Computer science 25

Innovative Engineering 35 / MIT BWSI – E textiles and Wearable Technology
Step into the future of engineering with this capstone course! In *Innovative Engineering 35*, students will polish their design process skills, delving into industrial design to create innovative, user-focused solutions.

Building on these foundations, students will have the opportunity to explore the future of design with MIT's Beaver Works Summer Institute's "E-Textiles and Wearable Technology" module. In partnership with the Advanced Functional Fabrics of America (AFFOA), this module exposes students to textile production, electronic prototyping, and the design process for wearable technology. Students will learn to embed electrical systems into textiles, gaining hands-on experience in creating wearable items that address real-world problems.

To finish it all off, you will complete a final "Capstone" project where you'll tackle real-world challenges, manage complex projects, and present your visionary solutions with confidence. This is your chance to lead the way in engineering innovation.

Prerequisite: Innovative Engineering 25
Programming or Robotics experience will be an asset

Space Exploration 35 / MIT BWSI "CubeSat" Challenge

The *Space exploration* 35 course continues the journey into the fascinating world of celestial bodies, space exploration, and the foundational principles of astrophysics.

Students will probe deeper into the cosmos, investigating the latest technological advancements shaping humanity's reach into space. By embracing the age-old human curiosity about the cosmos, students will critically examine their place within the solar system and the broader universe.

For those eager to go further, the course offers an exciting opportunity to participate in the MIT Beaver Works Build a CubeSat Challenge—a national competition where student teams design, prototype, and simulate satellite subsystems capable of supporting an optical payload. "CubeSat" design teams will tackle real-world engineering tasks, from powering and analyzing data to wirelessly transmitting results to a simulated ground station, all while showcasing their innovations in a high-profile academic arena.

Prerequisite: Space Exploration 25