CSLINC

Computer Science Inclusive Learning Environment

Module Guide
2025/26 Academic Year

COMPUTER SCIENCE INCLUSIVE LEARNING ENVIRONMENT (CS_LINC)

CS_LINC provides formal Computer Science (CS) curricula through equitable online modules. Teachers can deliver modules synchronously, asynchronously, virtually, blended or face-to-face. CS_LINC aims to promote and increase capacity and sustainability for access to the Leaving Certificate Computer Science subject at 2nd Level, where currently there is a void for Transition Year (TY) CS curricula, as well as a need for curricula and supports for Junior Cycle.

CS_LINC consists of a free, online student learning environment for Computer Science, featuring a range of modules built upon international best practices with varying collaborators, and tailored to Irish 2nd Level students. The CS_LINC platform also includes automated assessment whereby students, upon successful completion of a module, will receive certification. The CS_LINC project is facilitated by the CSinc Research Centre at TU Dublin.

CS_LINC Consists of:

- Lesson plans, PowerPoint presentations, videos, classroom/homework activities and solutions, module quizzes
- A full suite of tools to deliver Computer Science modules in the classroom
- Modules available from an e-learning platform, whereby students can progress through learning content at their own pace or alongside the pace of the class

How to Sign Up to CS_LINC:

Teachers can visit the CSinc website (www.csinc.ie) to register their students for any of the CS_LINC modules detailed within this booklet. Following registration, the CSinc Team at TU Dublin will create learner profiles for each CS_LINC user and will email module access details to individual users.

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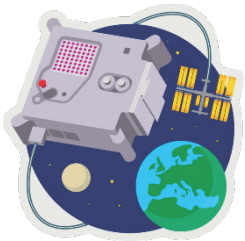
Astro Pi with ESERO

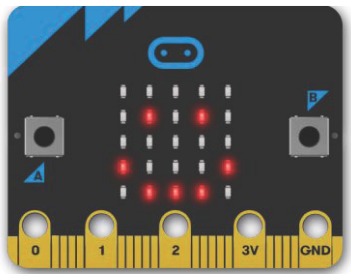


This module has been developed by ESERO Ireland, an education project of the European Space Agency, to assist students in competing in the Astro Pi Challenge, which is an ESA Education project run in collaboration with the Raspberry Pi Foundation. It offers young people the opportunity to conduct scientific investigations in space, by writing computer programs which run on Raspberry Pi computers on board the International Space Station (ISS).

The module requires no specific prior knowledge, and will guide students through the two Astro Pi challenges – Mission Zero and Mission Space Lab with presentations and practical exercises. By the end of the module, students will have the information they need to plan a project and write the basic code to collect data from the ISS, as well as more advanced code to analyse this data, including normalized difference vegetation index (NDVI) analysis to check plant health on Earth, and training Machine Learning models to recognise geographical features from space.

esero

BBC Micro:bit



This module is an introduction to basic coding on an embedded system. MakeCode for the BBC micro:bit environment uses block based coding and is online and easy to use. The module not only offers students the ability to learn basic programming tasks such as displaying to screen, branching and iteration, but it also allows them to use sensors such as temperature and light-making, for a very interactive and fun module.

This module covers inputs and outputs, problem solving, variables, branching, iteration, radio communication and interaction with external devices. This module is an exciting and hands-on way to introduce coding into the classroom, allowing the student scope to explore the world of Computer Science.

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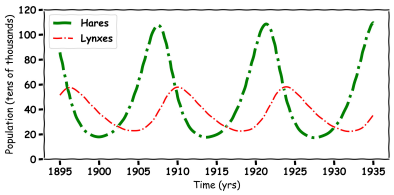
TU DUBLIN Ollscoil Teicneolaíochta Bhaile Átha Cliath Technological University Dublin

The Beauty and Joy of Computing

The Beauty and Joy of Computing (BJC) is an introductory computer science curriculum developed at the University of California, Berkeley. The authors of the BJC curriculum think that computer programming is one of the most satisfying of all human activities—it's generally fun (when it's not frustrating because of a bug you can't find). It's a game of skill, like chess, but without the competitive aspect, and with useful results beyond the act of programming itself. That's the best reason to study computer science, and we want all kids, not just the ones who fit the nerd stereotype, to experience our joy in programming which has been adapted for CS_LINC. This BJC module uses Snap!, which is like Scratch and is great for students who new to programming!

Circle of Life: Coding Predator Prey Relationships



This module introduces students to the use of programming as a tool for modelling the natural world, using the predator-prey relationship as a central theme. It combines coding in Python with real-world data, mathematical reasoning, and environmental science. The aim is to help students understand how simple simulations give rise to complex natural interactions, while also developing their coding and analytical skills.

The module begins with a conceptual introduction using the reintroduction of wolves to Yellowstone National Park, and ends with a brainstorming session where students apply what they've learned to model similar ecological scenarios. Each tutorial builds on the relationship between lynxes (predator) and snow hares (prey) and the animals interactions. Students will be able to simulate population growth using loops and plotting outputs to help interpretation and reflection on their results. A bonus tutorial offers an extension into disease modelling, including examples like COVID and fictional outbreaks, making the module both educational and engaging.

Cloud Computing

Cloud Computing is a very straight forward concept! Instead of having software installed and running on your laptop, smartphone or other computing device, it actually runs in a remote data centre – a huge warehouse full of extremely powerful servers. It's got nothing to do with clouds!

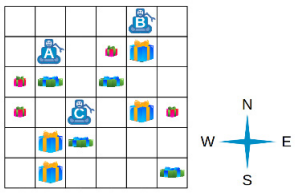
Within this module, we will unlock the power of the cloud. This module covers the fundamentals of cloud technology, including key concepts, deployment models, and service models. You'll learn about cloud architecture, security, and the benefits of cloud computing for businesses. Through real-world examples, students will gain practical skills in deploying and managing cloud services.

Computational Thinking

Santa's warehouse

In Santa's warehouse, three robots always work as a team. When the team gets a direction symbol (N, S, E, W), all robots move one grid square in that direction at the same time. After following a list of direction symbols, each robot picks up whatever present is in its grid square. There are only three different shapes of present in the warehouse: small, large, flat.

For example, if we give the list W, S to the team, then robot A will pick up a small present, robot B will pick up a small present, and robot C will pick up a large present.



QUESTION

What list can be sent so that each robot in the team picks up a different shape present?

A. E, S, S, E, E
B. E, W, W, S
C. E, S, N, S, W
D. E, S, S, W, W

Computational thinking is a problem-solving approach which everyone can learn and benefit from knowing about. It promotes logical thinking, reading, communication skills, teamwork and self-reflection. This module is unique in that Bebras tasks, renowned for their engaging style (see image), are used as a basis for the teaching material. Each lesson consists of an introduction to a computational thinking topic followed by problem-solving teamwork exercises.

The Bebras Challenge attracts 2.5 million pupils annually from 56 countries and is the most gender-neutral computer science activity worldwide. This module has been prepared by the Research Ireland-funded PACT team at Maynooth University. The PACT team creates international Bebras tasks on behalf of Ireland, assisting the national Bebras organiser, the Irish Computer Society.

Computer Systems

This module is an exploration into the technologies which students use, in their everyday lives. It investigates how each advancement in computers paved the way to some of the breakthrough technologies we see and leverage today. We will be going back through history to explain how each device and system made our new world possible and learn about the historical figures, that made these advancements a reality.

This module will also offer students insights into how their personal information is tracked on the internet through both their devices and their data. With some fun games both online, through the TecKno resource, and offline, classroom exercises will also keep students engaged in learning about Computer Systems.

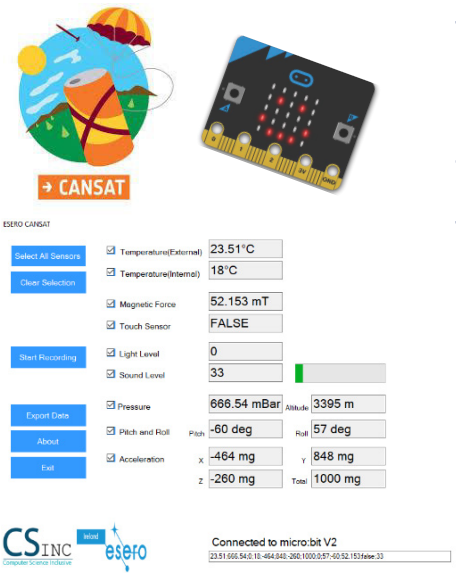
Cybersecurity

In this module, developed by Fidelity Investments, students explore the basics of Cybersecurity. In today's world we spend more time online than ever before. Similarly, the number of cyber crimes is also on the rise, at an alarming rate!

Throughout this module students will learn about the importance of cybersecurity in protecting individuals and organizations from cyber attacks with lots of fun challenges and activities. Students will be introduced to topics such as cyber threats, Application Security, Device Security, Personal Digital Security, Blockchain, Cryptography, Encryption, Data Breaches and the Dark Web.

The module does not require the students to have any prior experience of cybersecurity. All Lesson plans are provided and cater for all abilities. Each lesson concludes with a fun quiz!

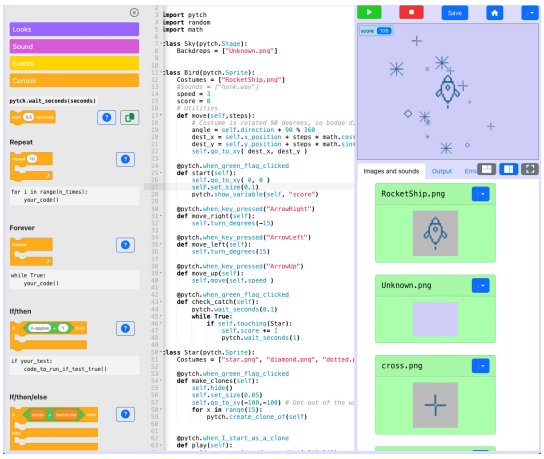
Design and Make a Micro:bit Satellite



This is a follow-on module from the BBC Micro:bit module. It takes the micro:bit module much further, where the end goal is to enter the ESERO CanSat challenge. The CanSat challenge enables students to launch their micro:bit into the sky and gather live data as it falls back to earth!

This module is an introductory module, where little to no coding experience is needed, and it builds upon the previous introduction to the BBC micro:bit module. All you need is a micro:bit to gather your data, while software is provided to capture all 13 sensors worth of data, for students to store and examine! Upon completion of this module students are then equipped to enter the CanSat challenge!

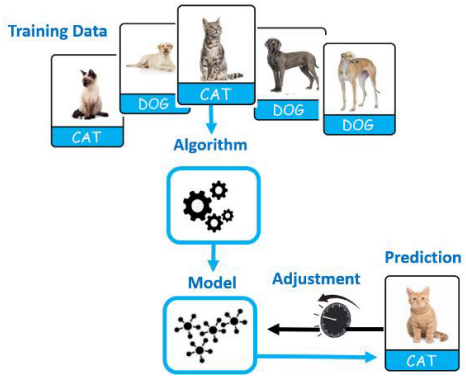
Introducing Python Coding with Pytch



This module offers students an opportunity to try some of the core components of Leaving Certificate Computer Science while making fun sprite-based games. Pytch takes inspiration from Scratch to make the fundamental concepts of Python programming easy to understand, and any student who has seen Scratch will recognise the familiar sprite-based development.

No prior programming experience is needed to take this module, and the web-based Pytch tools mean no installs or setup is required. This module provides a full complement of lesson plans and classroom assignments.

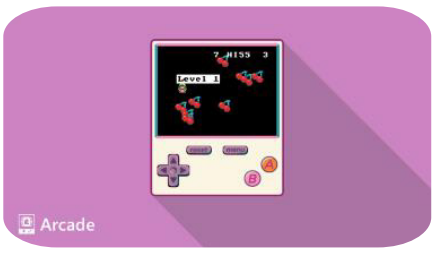
Machine Learning and AI



This module is an introduction to AI (Artificial Intelligence) and its two sub-fields - Machine Learning and Deep Learning. The module has an unplugged element, whereby all of the student tasks are pen and paper based. The goal of this module is to introduce students to how AI works, from an initial data set to final predictions. Topics include: Machine Learning and Data, Data Analysis and Pre-processing, Machine Learning Models, Neural Networks, Deep Learning and Evaluation and Machine Vision.

As an additional component, there are code examples provided for every topic covered (written in Python) but this is optional and therefore no prior programming experience is required. This module allows students to explore the process of developing AI models, with real life examples, such as predicting if your pet is a cat or a dog.

MakeCode Arcade

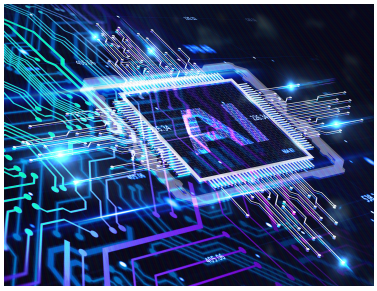


Retro Gaming, Modern Programming!

MakeCode Arcade is a code editor for building Retro Arcade games and there's nothing to install - the games will work in the browser! It is an exciting and engaging way to teach basic computer science concepts such as loops, conditional statements, and functions, all while creating sprites and designing game ideas.

MakeCode Arcade gives students a chance to be creative, and problem solve while covering key subject areas such as Mathematics, Science, Art, and Coding. Arcade comes with a 2D game engine with sprites, platformer-style collisions, tile maps, particle systems and more. The best part is that students can play their game on the simulator in the browser as they work on building out their code!

Navigating AI: Ethics, Privacy, and Career Pathways



This module is based on the Research Ireland ADAPT Centre's "AI in My Life" workshop series. It helps students understand the fundamentals of AI, its ethical implications, and its growing role in society and the workforce. It also explores career opportunities in AI and teaches students how to protect their digital privacy. This module can be delivered by teachers of any subject and does not require previous knowledge of AI.

Engaging Content
Engaging People

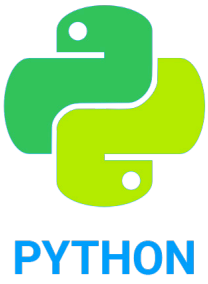
Python

PYTHON

This module is an introduction to the python programming language. Python is a text-based programming language, as opposed to a block-based programming such a Scratch or MakeCode. This module does not require students to have any prior programming experience. For students who may have previous exposure to block-based programming, this module would be a nice follow-on for them.

This introductory Python module covers basic programming concepts such as printing, strings, branching, iteration, lists and testing, which will allow students to take their first steps into text-based coding. All requirements, in terms of coding tools etc., are detailed in the module documentation for both students and teachers. Python is a great way to walk students through coding basics while engaging them with interesting tasks and projects.

Python as Gaeilge



Tá an modúl seo réamhrá ar an teanga ríomhchlárúcháin Python. Is é seo an chéad mhodúl ar an ardán CS_LINC seo atá aistrithe go Gaeilge againn. Tá Python bunaithe ar théacs teanga ríomhchlárúcháin seachas blocbhunaithe cláir den sórt sin a Scratch nó makecode le haghaidh an BBC micro:bit. Ní theastaíonn daltaí ón modúl seo aon taithí cláir roimh ré a bheith acu. Le haghaidh mic léinn a bhféadfadh taithí a bheith acu roimhe sin do bhloc—bunaithe ríomhchlárú, bheadh an modúl seo síneadh deas dóibh chomh maith.

Clúdaíonn an modúl seo buneolas coincheapa ríomhchlárúcháin amhail clódóireacht, teaghráin, brainseáil, atriall, liostaí agus tástáil a chuirfidh ar chumas na daltaí an chéad chéim a ghlacadh i gcódú téacsbhunaithe. Is iad na ceanglais go léir, i dtéarmaí uirlisí códaithe etc. mionsonraithe sa mhodúl do dhaltaí agus do mhúinteoirí araon. Is bealach iontach é an modúl seo chun mic léinn a chéimniú tríd buneolas códú agus iad ag dul i ngleic leo le tascanna agus tionscadail suimiúil.

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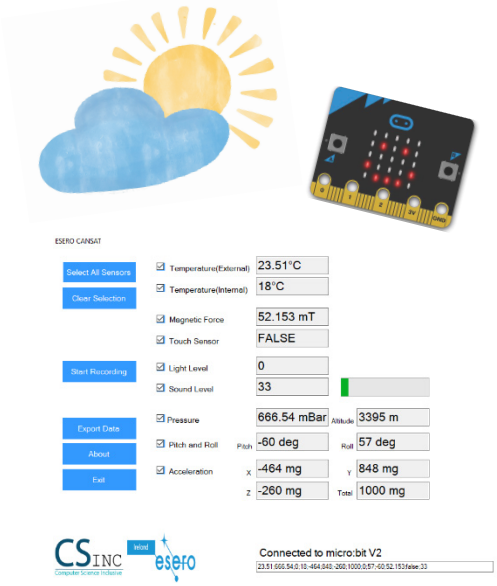
STEM with a Micro:Bit Satellite



BBC micro:bit sensors capture data from the environment. How can we use this technology to carry out scientific research? This module will allow students to dive into sensor data and design their own experiments, using micro:bit sensors to measure temperature, pressure, light levels and acceleration. Students can set up remote sensing experiments with a pair of micro:bits and also learn how to calibrate and evaluate their experiment data.

This module is an introductory module whereby little to no coding experience is required. It builds nicely upon the Design and Make a Micro:Bit Satellite and Introduction to the BBC Micro:bit modules. Software is also provided which will enable students to analyse their micro:bit data on a computer.

esero

Web Design and Development

This module is an introduction to the creation of simple web pages. Students do not require any prior knowledge to successfully complete this module. All technical requirements for this topic are covered in module content. Topics included on the module include introduction to basic webpage layout using HTML tags, adding features such as images and videos and linking and styling of webpages.

Students will also be introduced to Bootstrap - a coding language for building web pages. This module contains fun and exciting activities which allow students to explore their own digital creativity while learning. This HTML ad CSS module is a great way to introduce students to web page design and development.

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