



immerse
EDUCATION

Software Development & AI

SYLLABUS OVERVIEW

15-18 YEARS OLD

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About the Programme

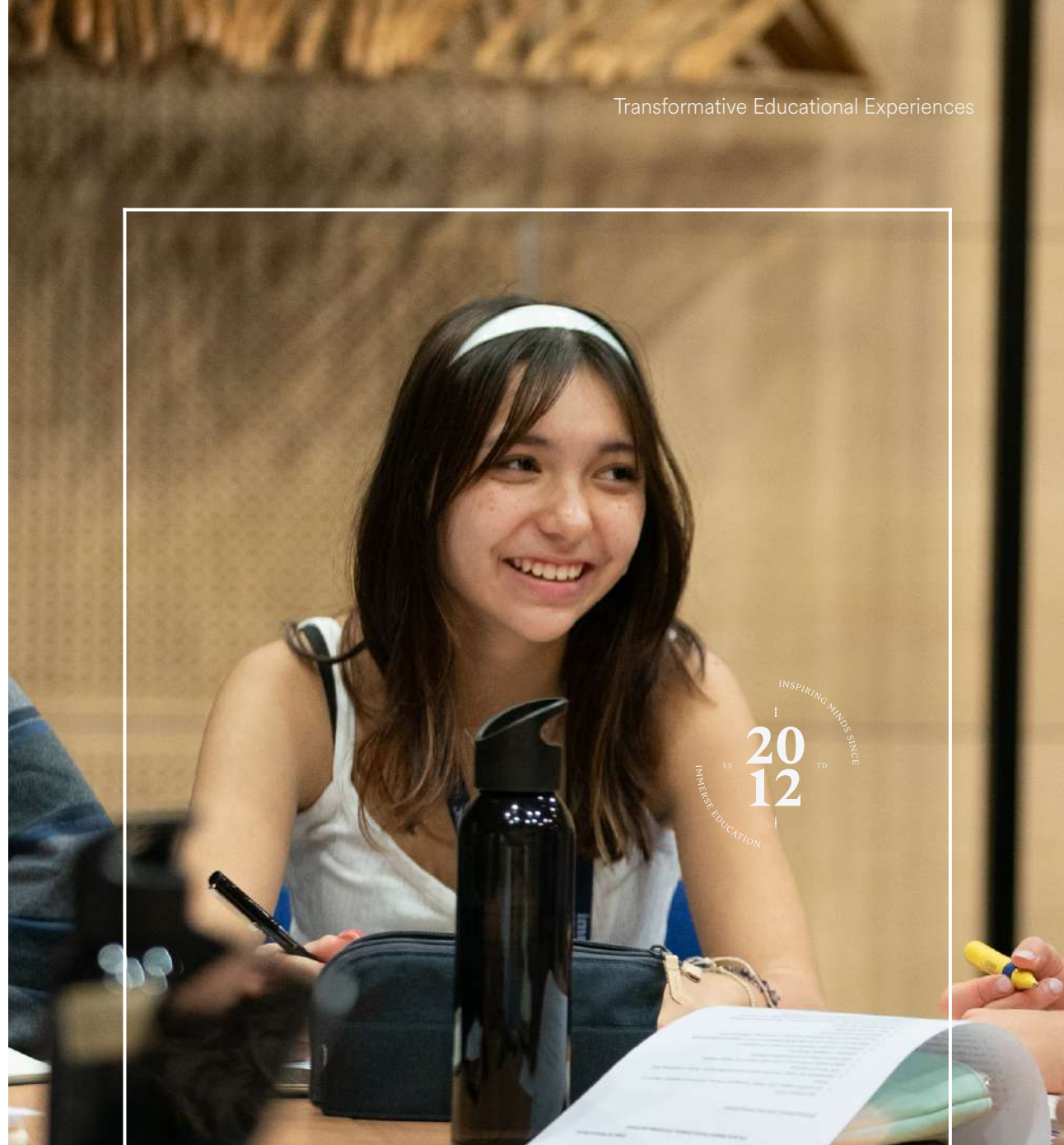
Immerse Education is an award-winning provider of summer experiences offering academic and career-focused programmes for high school students from worldwide, in such locations as Boston, Cambridge, London, New York, Oxford, San Francisco, Singapore, Sydney, Tokyo, and Toronto. These programmes aim to deliver engaging, academically challenging content within a university-style classroom environment.

Through academic sessions, the programme offer young students unique and valuable insights into what it would be like to study their chosen subject at an advanced level. This Syllabus Overview provides a summary of the topics and subject areas that participants can encounter during their studies with Immerse.

Academic Sessions

The academic sessions at Immerse are arranged into modules to enable participants to explore a broad range of topics over the course of their programme. The modules included in this syllabus overview are indicative but not prescriptive.

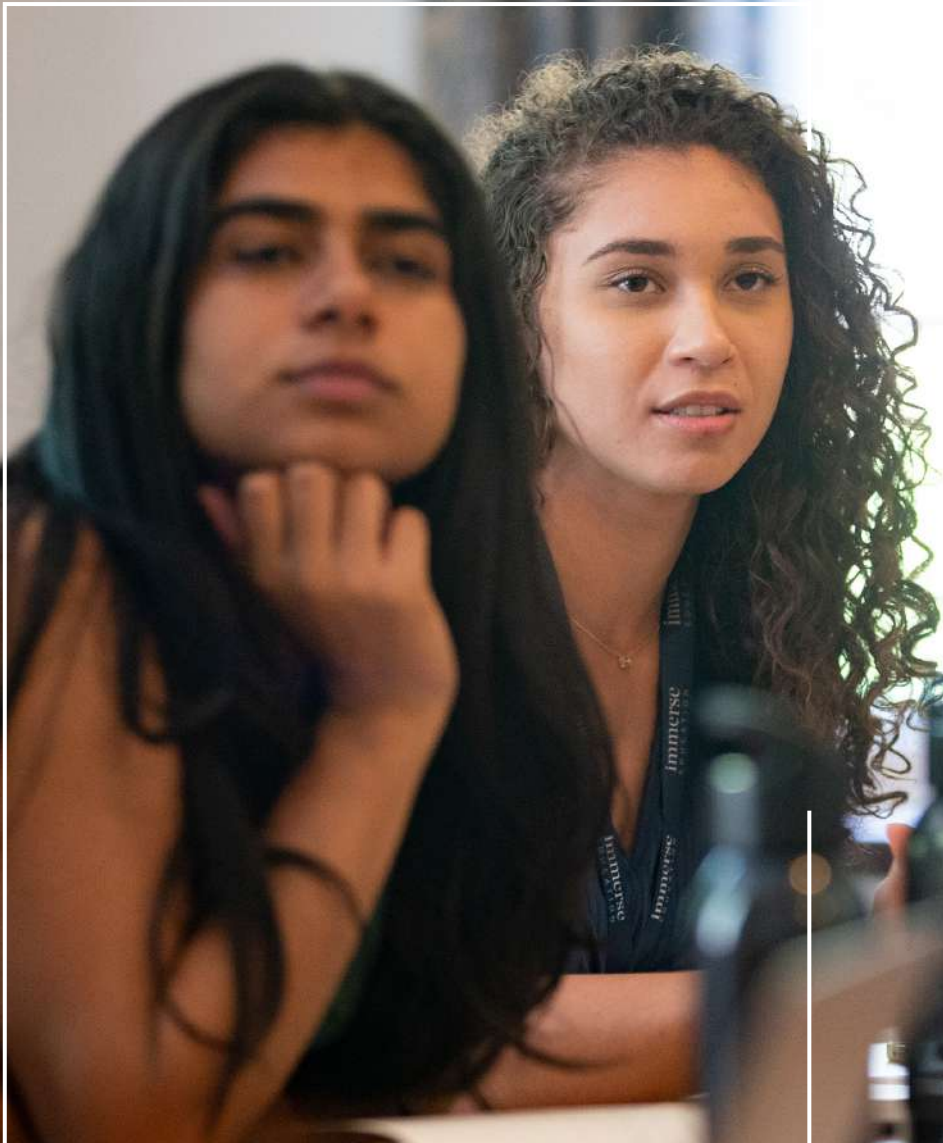
Tutors are encouraged to include their own specialisms and also focus on any particular areas of interest expressed by participants within the class. They may choose to provide further detail on a specific topic, or they may include new material and information that builds on the knowledge already developed during the programme.





Personal Project

Each programme includes an element of individual work, generally termed the 'Personal Project'. This can take many forms but is commonly an essay or presentation delivered on the final day of the programme. Participants will receive feedback on this work which may also be mentioned in the participant evaluation which is provided in writing by the tutor once the programmes have ended.



Preparatory work

Some tutors may ask participants to complete some preparatory work, such as reading or a series of exercises in advance of the programme. Participants are strongly encouraged to complete this work since it will be included in the opening sessions of the programme. Any preparatory tasks will be provided in advance of the programme directly to the participant.

Academic Difficulty

As all of our programmes are designed to provide a unique introduction to advanced material, the syllabus will be academically challenging at times.

This is something to be excited about and all of our tutors will encourage and support participants throughout the programme. Immerse Education aims to develop every participant regardless of ability, and our tutors will adapt their teaching to individual needs.

Aim of the Software Development & AI Programme

The Immerse Education Software Development and AI programme aims to provide participants with a comprehensive understanding of the interdisciplinary field of computer science, software development and artificial intelligence. Through in-depth exploration of various topics, participants will cultivate their analytical and problem-solving skills, enabling them to thrive in a technology-driven world. The programme encourages independent research, critical thinking, and hands-on application, while also guiding participants towards potential academic and career paths within the dynamic realms of computer science and AI.

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An Introduction to Computer Science and AI

In this session, participants will embark on a journey to uncover the foundational concepts of computer science and artificial intelligence. Exploring computer system components, programming languages, and operating systems, students will gain insights into the intricacies of the digital world. By laying foundations in topics such as artificial intelligence, robotics, and software engineering, participants will prepare for deeper study in the multidimensional field of computer science.



A large, stylized illustration of a human brain. The left hemisphere is composed of glowing blue circuitry, while the right hemisphere is a glowing yellow and orange organic shape. A human hand is shown from the bottom right, with the index finger pointing at the right hemisphere. In the top left corner, a robotic arm with glowing blue joints and a circular light at its end reaches towards the brain. The background is dark blue with a subtle pattern of white dots and a large, faint circular gear-like structure.

Specialisations and Tools in Software Development

This session introduces participants to the diverse specialisations within software development and the essential tools that empower professionals in this field. You'll gain insights into programming languages, software frameworks, and industry-standard development tools. Emphasis will be placed on algorithmic thinking and mastering the coding skills required to build, optimise, and maintain robust software systems, laying a strong foundation for navigating the dynamic software development landscape.



Real-World Applications of Software Development

In this session, participants will delve into the real-world applications of computer science and software development across various domains. From data processing and computer vision to machine learning, participants will explore the potential of computers to learn, think, and contribute to various aspects of society. By examining practical examples and case studies, participants will gain a deeper understanding of the transformative impact of computer science on the modern world.



Deep Learning and Neural Networks for Software Developers

Delving into the realm of neural networks, participants will uncover the fascinating world of deep learning. By examining the principles of neural networks, activation functions, and training processes, participants will gain insights into how computers mimic the human brain. Through hands-on exercises and practical implementation, participants will develop a strong foundation in neural networks, enabling them to explore the capabilities of this cutting-edge technology.

AI for Cybersecurity and Predictive Systems

Learn how artificial intelligence is applied to sequence modelling, predictive analytics, and cybersecurity in this advanced session. Participants will explore concepts like recurrent neural networks (RNNs), long short-term memory (LSTMs), and attention mechanisms to understand how software anticipates trends and prevents threats. The session also covers AI's critical role in securing digital environments, addressing identity authentication and data protection, essential for building resilient and trustworthy software systems.



Ethical Considerations in AI and Technology

As participants delve into the world of artificial intelligence and technology, they will also explore the ethical dilemmas and considerations that arise. Following on from previous topics, this session will engage participants in discussions about responsible AI development, bias in algorithms, data privacy, and the potential societal impacts of AI advancements. Through real-world examples and thought-provoking scenarios, participants will develop a heightened awareness of the ethical challenges faced by computer scientists and AI experts, preparing them to be responsible and conscious tech leaders.



Future Trends and Innovations in Software Development and AI

The landscape of software development artificial intelligence is constantly evolving, driven by technological advancements and innovative breakthroughs. In this session, participants will explore the latest trends and emerging technologies shaping these fields. From quantum computing and augmented reality to natural language processing and autonomous systems, participants will gain a glimpse into the future of technology. Through discussions, presentations, and hands-on activities, participants will ignite their curiosity and imagination, envisioning their role in shaping the technological landscape of tomorrow.

From Concept to Code: Entrepreneurship in Software Development

Innovation starts with an idea, and this session empowers participants to turn their software concepts into reality. Explore the entrepreneurial side of software development, learning how to launch tech-based ventures, protect intellectual property, and create competitive advantages. Through guest speakers, interactive exercises, and case studies, you'll gain insights into the strategies and challenges of building successful software products and startups, preparing you to navigate the tech industry's fast-paced environment.





Personal Project

Throughout the programme, participants will engage in a personal research-based project designed to consolidate their learning and showcase their academic research skills. Guided by a provided brief, participants will research and prepare a presentation, demonstrating their understanding of key concepts in software development and AI. The presentation will be followed by questions from peers and a class discussion, providing an opportunity for collaborative learning and exploration.



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