



Design Technology + STEM Curriculum Map

Intent

The curriculum has been designed to empower students with virtues that enable them to excel academically and spiritually inspiring them to serve humanity selflessly (Nishkam), with an abundance of love, compassion and forgiveness. The curriculum aims to support students to learn about peace, forgiveness, love and faith in the Divine through their academic subjects, faith practice and personal development.

Our curriculum is constructed around our vision to ensure we remain:

Faith-inspired: learning from the wisdom of religion

Our students explore the divine context of humanity and wonder of all creation. They not only learn about, but also learn from, the wisdom of religions and in so doing explore the infinite human potential to do good unconditionally. We support students to develop aspects of their own religious, spiritual or human identities. They learn about serenity through prayer and humility in service and in so doing, they deepen their own respective faith, and respect the common purpose of all religious traditions, as well as respecting the beliefs of those with no faith tradition. They explore the unique divinity of the individual, and our common humanity.

Virtues-led: nurturing compassionate, responsible human beings

We believe that the fostering of human virtues forms the foundation of all goodness. Our curricula are carefully enriched to allow experiences where our students, teachers and parents alike learn to grow through a conscious focus on virtues. Our virtues-led education approach helps to provide guidance to enable students to understand their choices in order to help lead better lives. Our students become self-reflective and flourish; they are able to build strong, meaningful relationships and understand their responsibilities to the global family and all creation, founded in faith. Students learn to experience faith through lived out through righteous living in thought, action and deed.

Aspiring for Excellence: in all that we do.

Our students and staff alike aim to become the best human beings they can possibly be, in all aspects of spiritual, social, intellectual and physical life. We foster a school culture which inspires optimism and confidence, hope and determination for all to achieve their best possible. This is accomplished through a rich and challenging curriculum, along with excellent teaching to nurture awe and wonder. Students gain a breadth and depth of knowledge and a love of learning to achieve their full potential.

The curriculum at Nishkam School West London has been carefully crafted to be broad, balanced and stimulating, giving every Nishkam student the opportunity to be knowledgeable, multi-skilled, highly literate, highly numerate, creative, expressive, compassionate and

confident people. Knowledge-rich, skills based and Faith-inspired, the Curriculum at Nishkam School West London is delivered through three **Golden Threads** that are unique to our ethos and virtues:

1	Love and forgiveness vs. Enmity and Hate
2	Peace and Collaboration vs. Conflict and War
3	Trust in God

Every composite of our curriculum is constructed of components that have each of these threads at their core. These elements can be clearly identified in our subject-based curriculum maps and Schemes of Learning documents.

The Nishkam vision for Design and Technology is to give students the skills and abilities to engage positively with the designed and made world. They learn how products and systems are designed and manufactured, how to be innovative and to make creative use of a variety of resources including traditional and digital technologies, to improve the world around them.

At the centre of the subject is creativity and imagination. Design & Technology is a subject which draws, develops and implements a range of different disciplines including mathematics, science, engineering, computing, geography, business studies and art. The subject embeds high quality literacy skills through analysis and evaluation techniques.

Our Design & Technology curriculum will give the students an opportunity to:

Research and Design

- Engage in an iterative process of design and making.
- Undergo primary and secondary research techniques into a range of user's needs, wants and values, analysis of existing products, ergonomics and anthropometrics and the work of others.
- Identify and solve their own problems and the problems of specific clients and target market groups.
- Develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations.
- Use a variety of design strategies when developing ideas using the iterative design process.
- Develop and communicate their design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools.
- Make informed decisions about food and nutrition and allows them to acquire knowledge in order to be able to feed themselves and others affordably and nutritiously, now and later in life.
- Develop knowledge and understanding of the functional properties and chemical characteristics of food as well as a sound knowledge of the nutritional content of food and drinks.

Make

- Select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computer-aided manufacture.
- Select from and use a wider, more complex range of materials, components and ingredients, taking into account their properties.
- Demonstrate knowledge and understanding of functional and nutritional properties, sensory qualities and microbiological food safety considerations when preparing, processing, storing, cooking and serving food.
- Explore a range of ingredients and processes from different culinary traditions (traditional British and international) to inspire new ideas or modify existing recipes

Evaluate

- Analyse the work of past and present professionals and others to develop and broaden their understanding.
- Investigate new and emerging technologies.
- Personal project work, analysing how the product fulfils the requirements of the specification and the user's needs, wants and values.
- Recognise how their product can be modified for commercial manufacturing
- Understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists

The curriculum is necessarily aspirational, focused on excellence and on securing in all learners a love of learning through the acquisition of knowledge, the study and practice of faith, and an understanding of the world around them. One aspect of the curriculum is the school ethos of the golden threads. Students will learn via collaboration, peace, forgiveness, and love through each unit of work.

Implementation:

Primary phase is guided by the Kapow Scheme of Work for Design Technology. The curriculum is built around essential knowledge, understanding and key skills. These are broken into year group expectations and show clear continuity and progress.

The Kapow's **Design and Technology** scheme has a clear progression of skills and knowledge within the five National Curriculum strands (Design, Make, Evaluate, Technical Knowledge & Cooking and Nutrition) across each year group. Students respond to design briefs and scenarios that require consideration of the needs of others, developing their skills in six key areas:

- Mechanisms
- Structures
- Textiles
- Food
- Electrical systems (KS2) and
- Digital world (KS2)

Each of our key areas follows the design process (design, make and evaluate) and has a particular theme and focus from the technical knowledge or cooking and nutrition section of the curriculum. The scheme is a spiral curriculum, with key areas revisited again and again with increasing complexity, allowing students to revisit and build on their previous learning.

In the Primary phase, we block the delivery of subject content for Art & Design/Design Technology/History/Geography so that we can limit the risk of what is known as cognitive overload - the process where an individual's working memory is overloaded and unable to process new information effectively due to the amount of information it is being required to process. Block teaching allows for all subjects to be taught in equal equity and have quality focused time. It allows us to ensure that no single subject or subjects are given reduced attention and that no subjects are missed from the curriculum. We ensure that there is full coverage of the knowledge and skills required in each block for Art & Design/Design Technology/History/Geography across each year group, as per the Kapow scheme.

It also allows for staff to focus on quality implementation, as the intent of each block is pre-determined. Staff spend time ensuring there is effective building of sequential knowledge, with shorter time periods between adding new knowledge to existing knowledge. We also provide meaningful opportunities to revisit, recap and assess following a teaching sequence. We believe block teaching also allows for staff to address any misconceptions quickly and within a block. We recognise that cognitive overload could be a key barrier to preventing the full learning of subject content for our pupils if we expect them to continuously process content from 14 different subjects every single week. We are aware that if we can limit the amount of new information from different subjects that the pupils have to hold in their short-term memory then this will have obvious benefits. This approach is grounded in careful research and neuroscience.

Our curriculum in the Secondary Phase is taught through discrete DT and STEM lessons (Year 7&8) where students undertake four main projects throughout the year and is supplemented through cross curricular teaching through subjects such as Art, Craft & Design, Food Technology and Computing. The Food and Nutrition Curriculum is split into three distinct areas: theory, skills and practical. Students studying this course learn problem solving skills by experimenting, making mistakes, evaluating and making plans for future success. This skill is transferrable across all subjects and areas of their life. By being given the opportunity to experiment and try a variety of disciplines and materials, it is our goal that students will find their strength and talent within the field of art and will develop confidence and self-awareness.

Curriculum Overview

Year	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Rec	Early Learning Goal: Physical Development •Progress towards a more fluent style of moving, with developing control and grace. •Develop their small motor skills so that they can use a range of tools competently, safely and confidently. •Use their core muscle strength to achieve a good posture when sitting at a table or sitting on the floor. Fine Motor Skills •Use a range of small tools, including scissors, paintbrushes and cutlery. •Hold a pencil effectively in preparation for fluent writing – using the tripod grip in almost all cases. •Begin to show accuracy and care when drawing.					

	Early Learning Goal: Expressive Arts & Design •Explore, use and refine a variety of artistic effects to express their ideas and feelings. •Return to and build on their previous learning, refining ideas and developing their ability to represent them. •Create collaboratively, sharing ideas, resources and skills. Creating with Materials •Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. •Share their creations, explaining the process they have used.					
1		Textiles: Puppets		Structures: Constructing windmills		Cooking & Nutrition: Fruit and vegetables
2		Mechanisms: Making a moving monster		Structures: Baby bear's chair		Mechanisms: Fairground wheel
3		Textiles: Cross-stitch and Applique Cushions		Cooking & Nutrition: Eating seasonally		Digital World: Pneumatic Toys
4		Structure: Pavilions		Mechanical systems: Making a slingshot car		Electrical systems: Torches
5		Mechanical systems: Making a pop-up book		Electrical systems: Doodlers		Cooking & Nutrition: What could be healthier?
6		Electrical Systems Steady Hand Game		Textiles: Waistcoats		Structure: Playgrounds
7	Art Craft and Design: Pop Art Project	STEM & DT: Aeroplanes and Airports	Art Craft and Design: Natan Design Theory	STEM & DT: Theme Parks	Art Craft and Design: Indigenous Art Animals	Art Craft and Design: Perspective

	Making a pop-up book DT Curriculum covered: D1, D2, D5, M1, M2, E1 STEM & DT: The importance of Bridges Students focus on bridges and their importance in society. The students examine their geographical importance and the engineering behind them. Students will design and build their own bridges along with constructing model bridges including the Golden Gate Bridge DT Curriculum covered: D1-D5, M1-M2, E1-E4	Students examine the importance of airports in connecting the work. They will examine the marketing used to promote airlines. Students will design and build their own model aircraft DT Curriculum covered: D2-D5, M1-M2, E1-E4, T1	Making a pop-up book DT Curriculum covered: D1, D2, D5, M1, M2, E1 Computing: Programming in Scratch Develop a Pac Man game DT Curriculum covered: D1, D2, D3, D4, E3	Students look the geography, marketing and engineering behind successful theme parks. Students will design their own theme park rides and get an opportunity to construct models using Knex kits DT Curriculum covered: D1-D5, M1-M2, E1-E4, T1-T4	DT Curriculum covered: D1, D2, D5, M1, M2, E1 STEM & DT: The Car and the combustion engine Students examine the combustion engine and its impact on society. Students will also focus on the move toward more sustainable transport. Students will look at the marketing used by major car manufacturers. Students will also use Knex sets to construct their own vehicles DT Curriculum covered:	DT Curriculum covered: D1, D2, D5, M1, M2, E1 Computing: Programming in Scratch Develop a dance battle game DT Curriculum covered: D1, D2, D3, D4, E3
8	Art Craft and Design: Embroidery Project DT Curriculum covered: D1, D2,	Art Craft and Design: Pinch Pot Monsters DT Curriculum covered: M1, M2, E1, T1	Art Craft and Design: Identity (Sikh Art) DT Curriculum covered: D1, D2, D5, M1, M2, E1, T1	Art Craft and Design: Tone DT Curriculum covered: M1, M2, E1, T1	Art Craft and Design: Cubism DT Curriculum covered: D1, D2, D5, M1, M2, E1	Art Craft and Design: Perspective DT Curriculum covered: D1, D2, D5, M1, M2, E1

	D5, M1, M2, E1, T1 Food and Nutrition: Preparing Food DT Curriculum covered: C1, C4 STEM & DT: How do we launch objects into Space? Students focus on the importance of space exploration and examine the different types of objects used. Students will evaluate the designs of existing rocket and rover designs and understand how the field of space exploration is changing. The students will revisit principles of aerodynamic design covered in Year 7 and understand the forces involved in	Food and Nutrition: Presenting Food DT Curriculum covered: C1, C2, C3 STEM & DT: Harnessing Renewable Energy Resources Students will examine the importance of harnessing renewable energy sources such as wind power. Students will understand the principles of energy conservation and the impact of fossil fuel use on the environment. The students will design and build a wind turbine, aimed at increasing the number of cities using wind power. DT Curriculum covered: D1-D5, E1-E4	Food and Nutrition: Expanding our Food Repertoire DT Curriculum covered: C1, C2, C3	Food and Nutrition: Preparing Food DT Curriculum covered: C1, C2, C3 STEM & DT: Artificial Intelligence & Supporting an Ageing Society Students will understand the challenges facing modern societies and their populations age. Students will explore how technology can be used to support the elderly to live independently and consider the ethical issues involved in using AI. Students will design and program and AI personal assistant tool to support an older person living alone. DT Curriculum covered: D1-D5, E2-E4, T4	Food and Nutrition: Presenting Food DT Curriculum covered: C1, C2, C3 STEM & DT: Bionic Limbs DT Curriculum covered: Students will explore the design and development of bionic limbs over the last century. They will explore the impact of forces on users of bionic limbs with a focus on wear and tear. Students will design a simple 3d prosthetic and use 3D printers to develop their prototypes. D1-D5, M1-M2, T2 & T4	Food and Nutrition: Expanding our Food Repertoire DT Curriculum covered: C1, C2, C3
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	launching an object into space. The students will design and build their own model space rockets using 3D printing devices. DT Curriculum covered: D2-D5, M1, E1 & E3, T1					
9	Art Craft and Design: Issue based graphics DT Curriculum covered: D1, D2, D3, D4, D5, M1, M2, E1, E3, T1 Food and Nutrition: Understanding Different Food Groups DT Curriculum covered: C1, C4	Art Craft and Design: Issue based graphics DT Curriculum covered: D1, D2, D3, D4, D5, M1, M2, E1, E3, T1 Food and Nutrition: The Appeal of Food and Flavour DT Curriculum covered: C1, C2, C3, C4	Art Craft and Design: Issue based graphics DT Curriculum covered: D1, D2, D3, D4, D5, M1, M2, E1, E3, T1 Food and Nutrition: Global Food DT Curriculum covered: C1, C2, C3, C4	Art Craft and Design: Ceramics DT Curriculum covered: D3, D4, M1, M2, E1, T1 Food and Nutrition: Different Forms of Food DT Curriculum covered: C1, C2, C3, C4	Art Craft and Design: Surrealism and photomontage DT Curriculum covered: D1, D2, D5, M1, M2, E1 The Appeal of Food and Flavour DT Curriculum covered: C1, C2, C3, C4	Art Craft and Design: Nature DT Curriculum covered: D1, D2, D5, M1, M2, E1 Food and Nutrition: Global Food DT Curriculum covered: C1, C2, C3, C4 Computing: Programming in Scratch Develop a mobile phone app DT Curriculum covered: D1, D2, D3, D4, E3, E4

10	See subject specific curriculum maps for greater detail: • Art Craft and Design • Food and Nutrition • Computing
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Design Technology:

Points from the Design Technology Curriculum (KS3) that are covered in are indicated above using the code below.

	Design-
D1	Research and exploration, such as the study of different cultures, to identify and understand user needs
D2	Identify and solve their own design problems and understand how to reformulate problems given to them
D3	Develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations
D4	Use a variety of approaches [for example, biomimicry and user-centred design], to generate creative ideas and avoid stereotypical responses
D5	Develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools
	Make-
M1	Select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computer-aided manufacture
M2	Select from and use a wider, more complex range of materials, components and ingredients, taking into account their properties
	Evaluate-
E1	Analyse the work of past and present professionals and others to develop and broaden their understanding
E2	Investigate new and emerging technologies
E3	Test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups
E4	Understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists
	Technical knowledge-
T1	Understand and use the properties of materials and the performance of structural elements to achieve functioning solutions
T2	Understand how more advanced mechanical systems used in their products enable changes in movement and force
T3	Understand how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs]
T4	Apply computing and use electronics to embed intelligence in products that respond to inputs [for example, sensors], and control outputs [for example, actuators], using programmable components [for example, microcontrollers].

	Cooking and nutrition-	
C1	Understand and apply the principles of nutrition and health	
C2	Cook a repertoire of predominantly savoury dishes so that they are able to feed themselves and others a healthy and varied diet	
C3	Become competent in a range of cooking techniques [for example, selecting and preparing ingredients; using utensils and electrical equipment; applying heat in different ways; using awareness of taste, texture and smell to decide how to season dishes and combine ingredients; adapting and using their own recipes]	
C4	Understand the source, seasonality and characteristics of a broad range of ingredients.	

Enrichment Opportunities:

Our curriculum extends beyond the National Curriculum and includes a wide range of enriching experiences and opportunities both within and beyond the school day. Students are provided with a rounded, culturally rich education through activities that enhance their learning.

Students have the opportunity to develop their potential to the maximum in a learning environment that is both challenging and enjoyable. They get involved in a number of cross-curricular activities across the year. After school clubs give students additional time to focus on the subject leading to skills development which can be translated back to classroom. It also gives them the freedom to try new things. Creative homework projects encourage self-expression and builds students' confidence. Design Technology enrichment days provide valuable space where students can continue to develop their own individual programme of work. Design Technology displays held around school give students the opportunity to reflect upon their work.

Students will have the opportunity to attend trips to museums and galleries linked to the projects they are completing as signposted above. Visiting artists will also give students the opportunity to develop a dialogue with practitioners and reflect on their own artist practise. Art clubs at KS3 and KS4 will provide extra study time and further opportunities to experiment with different materials and resources outside of lessons. Displaying students work and having regular exhibitions of artwork will allow students to celebrate their achievements in a whole school capacity. Students studying GCSE Art in Year 11 will have an opportunity to visit the Tate Modern in the Autumn 2 term.

Year 7, 8, 9 Workshops and Visits	Activities	Links to the DT curriculum
Visit to the Design Museum	Designer Maker User Exhibition features almost 1000 items of twentieth and twenty-first century design viewed through the angles of the designer, manufacturer and user, including a crowdsourced wall.	E2 Investigate new and emerging technologies

Year 7 Visit to the Science Museum	The free display covers a broad range of design disciplines, from architecture and engineering to the digital world, fashion and graphics. Hands on Design Workshop- Chairs and Seating What makes a good chair and why are designers obsessed with perfecting this particular piece of furniture? Students are given a user centre design brief and asked to create their own design in response to it. Pre-visit task: MY ROBOT MISSION AR This new skills-building app combines a series of fun challenges and the latest augmented reality technology to help you think like a scientist. Create your own robot and help it overcome future world problems. https://play.google.com/store/apps/details?id=com.factory42.myrobotmissionar https://apps.apple.com/us/app/id1526505719	E4 Understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists T2 Understand how more advanced mechanical systems used in their products enable changes in movement and force T3 Understand how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs]
Heathrow Airport- Future Engineers Programme	Aimed at Year 8 students, this 2 hour workshop will bring careers at Heathrow to life (focusing on engineering, but with an awareness that there is a vast array of careers available) and cover skills required by employers. The bulk of the session (up to an hour) will be an interactive challenge – coding a microbit robot to follow a route along a map of the airport. We will bring all of the kit required for the robot, including a tablet for each team of young people to programme (teams of 3-4 students). The session is supported by volunteers from the airport, to bring careers to life, and answer questions about life in Heathrow."	T4 Apply computing and use electronics to embed intelligence in products that respond to inputs [for example, sensors], and control outputs [for example, actuators], using programmable components [for example, microcontrollers].

Royal Navy/British Army Visit	90 minute ready steady cook challenge. The students will be working in teams to create a main and a dessert which they will present to the team and get some feed	C2 Cook a repertoire of predominantly savoury dishes so that they are able to feed themselves and others a healthy and varied diet C3 Become competent in a range of cooking techniques [for example, selecting and preparing ingredients; using utensils and electrical equipment; applying heat in different ways; using awareness of taste, texture and smell to decide how to season dishes and combine ingredients; adapting and using their own recipes
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Year 6 to 7 Transition:

Over the course of the academic year there is regular discussion between the Curriculum Leads. There are opportunities for cross-phase leaders to spend time in classrooms and observe cross-phase. Secondary phase teachers have previously taught in the primary phase are familiar with the Kapow scheme of work. Students have the opportunities to share DT projects with each other and primary phase visit the secondary art room to look at displays and meet the specialist teacher. This provides the opportunity for collaboration on content studied across the Key Stages and the skills that are developed. This ensures that at Key Stage 3 we are able to build on and develop the foundations laid at Key Stage 2.

The KS3 curriculum is designed with progression in mind with the Virtues and Golden Threads at its heart. At the beginning of year 7 all students complete a baseline assessment which ensures that subject specific data can be used to assess their progress across KS3-5. Students are also asked to complete an MS FORMS questionnaire to collect information on what types of projects, materials, skills and knowledge they have experienced in primary school because not all students transition into the secondary phase are from the primary phase. Collecting this information helps build a picture of their experiences so that tasks, projects and skills in KS3 can be better differentiated and adapted. The KS3 curriculum is designed to build upon skills that that already exist whilst closing gaps for students who may not have these skills.

Impact:

Evidence of work will show a range of strands explored, links across the curriculum and work pitched to support and challenge a range of abilities and starting points. Formative assessment is an integral part of our approach to Teaching and Learning.

In the Primary phase, teachers use assessment for learning within lessons to provide live feedback to allow pupils to deepen their understanding and identify gaps in knowledge and skills. Knowledge reviews are planned for spaced retrieval and allow for misconceptions to be addressed and further embed pupils understanding of key knowledge, skills and vocabulary. The progression of skills and knowledge allows teachers to assess the impact over the course of a unit, year and across phases. The scheme of learning is used to identify prior links and future learning which informs teacher assessment and allows building blocks of learning to further develop schemas within topics and across subjects.

Summative assessments are used alongside knowledge organisers to assess the impact of learning at the end of a unit. This in turn informs future teaching adaptations, based on misconceptions and gaps in knowledge and skills. Enquiry questions are used to assess the impact of the teaching of knowledge, skills and vocabulary by allowing pupils to apply their understanding through reflections and critical thinking.

In the Primary phase, students are involved in the evaluation, dialogue and decision making about the quality of their outcomes and improvements they need to make. By taking part in regular discussions and decision-making processes, students they will be able to talk confidently about their learning journey and have a growing understanding of how to improve.

In the Secondary phase, over the course of their study, we will use weekly cumulative formative diagnostic assessments (in class or for homework) to ensure that students are consistently retrieving their knowledge of different components. The purpose of this is to ensure all knowledge is retained (and any gaps are identified and addressed promptly) and also to inform teachers' planning. Using this style of assessment, we will make use of the advantages of spaced practice as well as allowing students to be able to apply their knowledge to a wide variety of contexts.

Students will also sit a summative assessment every full term. This assessment will be cumulative and will assess not only what the students have learned over the previous term, but also their understanding of all relevant material previously taught. Staff are supported to mark these accurately and post assessment moderation also takes place to ensure the validity of the data. All data is analysed centrally (not by teachers) and each Curriculum Leader is given a report outlining the areas of strength and weakness. Curriculum Leaders use this information to inform future planning, support with additional interventions and set changes.

Most projects will produce final outcomes or final pieces. Sketchbook work and loose paperwork will allow students to build a body of work and skills which cover all formal elements and ultimately prepare them for the rigour of GCSE and beyond.

All GCSE coursework and exam work will be moderated by colleagues from Nishkam High School Birmingham and colleagues from local schools within Hounslow to ensure accuracy of marking. Exam board provided exemplar materials will also be used to cross reference against the work of students at NSWL and ensure accuracy of marking.