JSA Science Experience at MQ
School STEM Incursion Program

OUTLINE
- Junior Science Academy staff will bring our programs to your classroom, with expert educators and all equipment and resources provided.
- Each program is a full-day experience with three sessions, each running for approximately 90 minutes. Programs may be booked as follows:
  - All three sessions booked for one class
  - One session booked multiple times for different classes
- Due to the hands-on nature of our programs, we rely on classroom teachers to support our staff during our sessions. No prior knowledge of the experiments or equipment is needed and we can provide information on the sessions in advance if desired.
- Programs are mapped to the NSW Science curriculum by stage.

ACCESSIBILITY
- All courses are designed to engage the diverse range of students found in every classroom. If you have students or staff with specific accessibility needs, please discuss these with us and we will do our best to accommodate them. If needed, we can bring a Roger FM assisted listening device.

COSTS
- During our pilot program (until the end of Term 2, 2023), each program costs $20 per student for the full day experience. A single session is $7 per student.
- For bookings in Term 3, 2023 and beyond, each program costs $30 per student for the full day experience. A single session is $12 per student.
- Minimum group size of 25 students. (Smaller groups may be booked at the cost of a group size of 25.)
- The fees include all materials and equipment needed (other than the requirements for each course below).

DETAILS
- Available days: Monday-Wednesday.
- The times below are a general indication and can be adjusted to suit your school's routines.

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00-10:30</td>
<td>Session 1</td>
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<tr>
<td>10:30-11:00</td>
<td>Morning tea</td>
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<tr>
<td>11:00-12:30</td>
<td>Session 2</td>
</tr>
<tr>
<td>12:30-1:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>1:00-2:30</td>
<td>Session 3</td>
</tr>
</tbody>
</table>

- Each session can accommodate groups of up to 30 students. For larger groups, please get in touch with us to discuss availability.
**Note:** The stages and years identified for each course are a guide. If you are interested in a course that is not identified for your class or group, please get in touch with us so that we can help you book the course that best suits you.

If there is a particular topic or focus area that you are interested in and is not covered by one of these courses, please contact us and we can discuss if or when a relevant course may be available.

<table>
<thead>
<tr>
<th>Course</th>
<th>Lesson Outline</th>
<th>Outcomes</th>
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</tr>
</thead>
</table>
| Scratch Junior (K-1) | Students will use Scratch Jr to learn the principles of coding and create their own animated stories.  
If your school has iPads you are keen to utilise more, or has accessed the stem.T4L Coding Kit, this course will model for teachers how these resources can be used in the classroom.  
**Session 1:** Introduction to coding & Scratch Jr; adding backgrounds, characters & basic actions  
**Session 2:** Customising actions, backgrounds & characters  
**Session 3:** Customising movements, coding interactions between characters & creating stories | **Design & Production (ES1):**  
- follow a sequence of steps and decisions (algorithms) needed to solve problems  
- order a sequence of steps and decisions (algorithms) needed to solve problems (ACTDIP004)  
**Digital Technologies (ES1):**  
- Students:  
  - explore familiar digital devices, for example: (ACTDIK001)  
  - a computer  
  - a device to take a digital image  
  - follow and describe a sequence of steps (algorithms), for example: ComT DesT SysT  
  - following a procedure, e.g. getting dressed for school in the morning  
  - following a recipe, e.g. baking a cake  
  - design a process to solve an identified problem, for example: ComT SysT  
  - set of instructions to get from one point to another  
  - set of instructions to log on to a computer | Digital Technologies | - iPads (one per pair of students). *If your school does not have these available, please contact us and we may be able to provide them.*  
- Projector screen or smartboard that can be connected to a laptop via HDMI cord  
- Large instructor table/desk at front of room with power point close by  
- Tables for students to work in pairs |
| **Once Upon A Slime** (1-2) | Students will discover the science behind slime and its properties. They will use the scientific method to develop and test a hypothesis about a range of slimes that they will create.  
**Session 1:** Introducing slime & making borax slime  
**Session 2:** Making cornflour & baking soda slime  
**Session 3:** Comparing slime features & making edible marshmallow slime | **Working Scientifically (S1):**  
- make predictions about possible findings (ACSIS024, ACSIS037)  
- explore and answer questions through participation in guided scientific investigations (ACSIS025, ACSIS038)  
- collect data from observations  
- record observations accurately and honestly using observational drawings, labelling, informal measurements and digital technologies (ACSIS026, ACSIS039)  
- compare observations with those of others (ACSIS213, ACSIS041)  
**Material World (S1):**  
- investigate how materials can be changed by bending, twisting and stretching (ACSSU018) DesT SysT  
- investigate how different materials can be combined (ACSSU031) SciT | **Material World**  
- Classroom/learning space with hard floors  
- Large instructor table/desk at front of room with power point close by  
- Projector screen or smartboard that can be connected to a laptop via HDMI cord  
- Tables for students to work in groups of 4 or less  
- Access to sinks for hand washing and clean up  
**Note:** This course includes a range of common household ingredients. Please contact us for a full list of materials if you have allergen concerns. |
| **Matter Mayhem** (K-1) | Students will explore the properties of different types of matter through creating slime and dry ice bubbles. They will observe and carry out a range of chemical reactions to discover what happens when substances are combined.  
**Session 1:** Exploring reactions in food, making honeycomb & clock reactions  
**Session 2:** Elephant’s toothpaste & borax slime  
**Session 3:** Making chemical reactions & dry ice bubbles | **Working Scientifically (ES1):**  
- respond to questions about familiar objects and events (ACSIS014)  
- make observations using senses through participation in guided scientific investigations  
- record observations using drawings, simple digital recording methods, oral descriptions and/or simple visual representations (ACSIS011)  
- work collaboratively with others to investigate ideas  
- engage in discussions about observations  
**Material World (ES1):**  
- observe and describe some properties of a range of materials (ACSSU003) SciT | **Material World**  
- Classroom/learning space with hard floors  
- Large instructor table/desk at front of room with power point close by  
- Tables for students to work in groups of 4 or less  
- Access to sinks for hand washing and clean up  
- Access to kettle or hot water tap  
**Note:** This course includes a range of common household ingredients. It also includes making substances that students can take home to taste. Please contact us for a full list of materials if you have allergen concerns. |
| Take Charge (1-2) | Students will use snap circuit kits to explore electricity and build a range of different circuits to investigate the flow of electrons. They will create a maze that tests their learning skills and concentration.  

**Session 1:** Introducing circuits and building circuits with lights  

**Session 2:** Building circuits with fans and introducing series and parallel circuits  

**Session 3:** Exploring resistance and taking the maze challenge | Design & Production (S1):  
- identify technologies and appropriate materials needed to realise designed solutions (ACTDEP005)  
- manipulate a range of materials for a purpose  
- segment and sequence steps for making designed solutions  
- collaborate to develop designed solutions  

**Physical World (S1):**  
- identify sound, light, heat, electricity and movement as forms of energy (ACSSU020)  
- design and develop a product that uses one or more forms of energy to create change DesT SysT | Physical World  
- Large instructor table/desk at front of room with power point close by  
- Projector screen or smartboard that can be connected to a laptop via HDMI cord  
- Tables for students to work in groups of 4 or less |
### Stage 2

<table>
<thead>
<tr>
<th>Course</th>
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<th>Requirements</th>
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</table>
| **Scratch Me If You Can**  | Students will learn the basics of coding and binary with Scratch. They will code shapes, names and games. | **Design & Production:**  
- develop a sequence of steps and decisions (algorithms) to solve a problem (ACTDIP010)  
- generate visual programs using algorithms to create simple digital solutions  

**Digital Technologies:**  
Students:  
- identify and explore a range of digital systems and peripheral devices (ACTDIK007) ComT DesT SysT  
- design and produce digital solutions using a visual programming language (ACTDIP011) ComT DesT  | Digital Technologies | • One computer per student  
• Projector screen or smartboard that can be connected to a laptop via HDMI cord |
| (2-3)                      | If your school has computers you are keen to utilise more, or has accessed the stem.T4L Coding Kit, this course will model for teachers how these resources can be used in the classroom. |                                                                         |                       |                                                                            |
|                            | **Session 1:** Introduction to coding and binary; using motion blocks          |                                                                         |                       |                                                                            |
|                            | **Session 2:** Coding shapes and games                                         |                                                                         |                       |                                                                            |
|                            | **Session 3:** Coding practice with games and other projects                   |                                                                         |                       |                                                                            |
**Micro:bit Masterclass (3-4)**

Students will discover hardware and software concepts behind everyday objects and create new technologies. They will solve problems and program electronics using Micro:bits.

If your school has purchased Micro:bits or has accessed the stem.T4L Microcontroller Kit or Inventor Robotics Kit, this course will model for teachers how these resources can be used in the classroom.

**Session 1:** Introduction to coding, programming and binary

**Session 2:** Coding in practice with Minecraft’s Hour of Code

**Session 3:** Coding in practice with Micro:bits

**Design & Production:**
- develop a sequence of steps and decisions (algorithms) to solve a problem (ACTDIP010)
- generate visual programs using algorithms to create simple digital solutions
- collect, access and present data, using software to present and communicate information and solve problems (ACTDIP009)

**Digital Technologies:**

**Students:**
- identify and explore a range of digital systems and peripheral devices (ACTDIK007) ComT DesT SysT
- explore how digital systems transmit different types of data ComT SysT
- investigate how the same data can be represented in different ways, eg codes and symbols SciT

**Digital Technologies**

- One computer per student
- Projector screen or smartboard that can be connected to a laptop via HDMI cord

**Note:** This course covers similar skills to the Stage 3 Micro:bit course but is tailored to Stage 2 outcomes.
<table>
<thead>
<tr>
<th>Zippy Balloons (3-4)</th>
<th>Students explore concepts including forces, chemical reactions and changes of state using common household objects – zip lock bags and balloons.</th>
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</thead>
<tbody>
<tr>
<td><strong>Session 1:</strong> Making a hovercraft</td>
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<td><strong>Session 2:</strong> Chemical reaction rockets</td>
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<td><strong>Session 3:</strong> Heat conduction demonstration and making sherbet</td>
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<tr>
<td><strong>Working Scientifically:</strong></td>
<td></td>
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<tr>
<td>• identify and pose questions in familiar contexts that can be investigated scientifically</td>
<td></td>
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<tr>
<td>• conduct scientific investigations to find answers to questions</td>
<td></td>
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<tr>
<td>• represent and communicate observations, ideas and findings, using formal and informal representations (ACSIS060, ACSIS071)</td>
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<tr>
<td><strong>Design &amp; Production:</strong></td>
<td></td>
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<tr>
<td>• investigate and research materials, components, tools and techniques to produce design solutions (ACTDEP014)</td>
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<tr>
<td>• evaluate design ideas, processes and solutions, based on criteria for success (ACTDEP017)</td>
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<tr>
<td><strong>Material World:</strong></td>
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<tr>
<td>• describe examples of changes of state in everyday life SysT</td>
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<tr>
<td>• predict and observe the effects of adding or removing heat on a variety of solids and/or liquids SciT</td>
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<tr>
<td>• investigate how the properties of natural and processed materials influence their suitability and use in products, services and/or environments, for example: (ACSSU074, ACTDEK013) DesT SciT</td>
<td></td>
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<tr>
<td>o elasticity</td>
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<td>o thermal conductivity</td>
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<td><strong>Physical World:</strong></td>
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<tr>
<td>• describe the effects of heat energy, for example:</td>
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<tr>
<td>o melting</td>
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<tr>
<td>o expanding</td>
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<tr>
<td>• explore ways that heat can be transferred due to conduction (ACSSU049) SciT</td>
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<tr>
<td>• observe how contact and non-contact forces cause changes in the motion of objects, for example: (ACSSU076)</td>
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<tr>
<td>o changes in speed</td>
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<td>o changes in direction</td>
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<tr>
<td><strong>Material World &amp; Physical World:</strong></td>
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<tr>
<td>• Classroom/learning space with hard floors</td>
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<tr>
<td>• Large instructor table/desk at front of room with power point close by</td>
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<td>• Tables for students to work in groups of 4 or less</td>
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<td>• Projector screen or smartboard that can be connected to a laptop via HDMI cord</td>
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<td>• Access to sinks for hand washing and clean up</td>
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**Note:** This course includes a range of common household ingredients. It also includes making substances that students can take home to taste. Please contact us for a full list of materials if you have allergen concerns.
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</table>
| **Micro:bit Masterclass** (5-6) | Students will discover hardware and software concepts behind everyday objects and create new technologies. They will solve problems and program electronics using Micro:bits. | **Design & Production:**  
  - investigate materials, components, tools, techniques and processes required to achieve intended design solutions (ACTDEP024)  
  - design, modify and follow simple algorithms  
  - implement digital solutions as visual programs involving branching, iteration and user input (ACTDIP020) |
|                        | If your school has purchased Micro:bits or has accessed the stem.T4L Microcontroller Kit or Inventor Robotics Kit, this course will model for teachers how these resources can be used in the classroom. | **Digital Technologies:**  
  Students:  
  - identify how whole numbers are used to represent all data (binary) in digital systems (ACTDIK015) ComT SysT  
  - investigate internal and external components of digital systems that perform functions SciT  
  - explore how the main components of digital systems connect together to form networks that transmit data (ACTDIK014) ComT SysT  
  - describe how data can be transmitted between two digital components, for example:  
    - wired networks  
    - wireless networks  
    - design, modify and follow algorithms involving branching and iteration ComT DesT SysT  
  - define problems, and plan and implement digital solutions, using an appropriate visual programming language involving branching and iteration, and requiring user input ComT DesT SysT | Digital Technologies | - One computer per student  
- Projector screen or smartboard that can be connected to a laptop via HDMI cord |
|                        | Session 1: Introduction to coding, programming and binary |                                                                                                                                                                                                                   |                               | Note: This course covers similar skills to the Stage 2 Micro:bit course but is tailored to Stage 3 outcomes.                  |
|                        | Session 2: Coding in practice with Minecraft’s Hour of Code |                                                                                                                                                                                                                   |                               |                                                                                                                        |
|                        | Session 3: Coding in practice with Micro:bits |                                                                                                                                                                                                                   |                               |                                                                                                                        |
| Spike Prime Level 1 (4-6) | In this class students will build a foundation of robotics and coding skills. They will unlock their creative potential and critical thinking skills, designing and building robots using LEGO. Students will use their engineering skills to build robots, bring them robot to life, connect to the programmable hub and code instructions for them using Scratch coding language. They will also use their robots to carry out a scientific investigation. If your school has purchased LEGO Spike Prime kits or has accessed the Stem.T4L Inventor Robotics Kit, this course will model for teachers how these resources can be used in the classroom.  

**Session 1:** Introduction to coding & robotics; programming movement  

**Session 2:** Movement coding challenge & robotics investigation  

**Session 3:** Robot racing & conclusion | Design & Production:  
- investigate materials, components, tools, techniques and processes required to achieve intended design solutions (ACTDEP024)  
- design, modify and follow simple algorithms  
- implement digital solutions as visual programs involving branching, iteration and user input (ACTDIP020)  

**Digital Technologies:**  
- Students:  
  - investigate internal and external components of digital systems that perform functions SciT  
  - explore how the main components of digital systems connect together to form networks that transmit data (ACTDIK014) ComT SysT  
  - describe how data can be transmitted between two digital components, for example:  
    - wired networks  
    - wireless networks  
  - design, modify and follow algorithms involving branching and iteration ComT DesT SysT  
  - define problems, and plan and implement digital solutions, using an appropriate visual programming language involving branching and iteration, and requiring user input ComT DesT SysT | Digital Technologies  
- iPads (one per pair of students). If your school does not have these available, please contact us as we may be able to provide them.  
- Projector screen or smartboard that can be connected to a laptop via HDMI cord  
- Classroom/learning space with hard floors and a clear floor area roughly 3x3m  
- Large instructor table/desk at front of room  
- Tables for students to work in groups of 4 or less |
| **Spike Prime Level 2** (4-6) | **Design & Production:**  
- investigate materials, components, tools, techniques and processes required to achieve intended design solutions (ACTDEP024)  
- design, modify and follow simple algorithms  
- implement digital solutions as visual programs involving branching, iteration and user input (ACTDIP020)  

**Digital Technologies:**  
- Students:  
  - investigate internal and external components of digital systems that perform functions SciT  
  - explore how the main components of digital systems connect together to form networks that transmit data (ACTDIK014) ComT SysT  
  - describe how data can be transmitted between two digital components, for example:  
    - wired networks  
    - wireless networks  
  - design, modify and follow algorithms involving branching and iteration ComT DesT SysT  
  - define problems, and plan and implement digital solutions, using an appropriate visual programming language involving branching and iteration, and requiring user input ComT DesT SysT  

**Session 1:** Problem solving with coding; programming sensors  
**Session 2:** Coding for sustainability; programming synchronised movements  
**Session 3:** Independent coding time; conclusion | **Digital Technologies**  
- iPads (one per pair of students). If your school does not have these available, please contact as we may be able to provide them.  
- Projector screen or smartboard that can be connected to a laptop via HDMI cord  
- Classroom/learning space with hard floors and a clear floor area roughly 3x3m  
- Large instructor table/desk at front of room  
- Tables for students to work in groups of 4 or less |
<table>
<thead>
<tr>
<th>Special Effects (4-6)</th>
<th>Students will explore how TV and movies produce special effects. They will use chemical reactions and their knowledge of living things to create magic potions, mysterious fog, gruesome fake wounds and much more.</th>
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</thead>
<tbody>
<tr>
<td><strong>Session 1:</strong> Creating potions with colour changes and dry ice fog</td>
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<tr>
<td><strong>Session 2:</strong> Zombie attack with organ dissection and zombie virus tracing</td>
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<tr>
<td><strong>Session 3:</strong> Special effects makeup – creating fake wounds.</td>
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</tbody>
</table>

**Working Scientifically:**
- make and justify predictions about scientific investigations (ACSIS231, ACSIS232)
- plan and apply the elements of scientific investigations to answer problems
- present data as evidence in developing explanations (ACSIS218, ACSIS221)

**Living World:**
- understand that scientific and technological knowledge is used to solve problems and inform personal and community decisions (ACSHE083, ACSHE100) SciT

**Material World:**
- investigate and compare the properties of solids, liquids and gases (ACSSU077) SciT
- explore that when materials are combined the result is either a mixture or a new substance, for example: (ACSSU095) SciT
  - salt and water
  - bicarbonate of soda and vinegar
- investigate characteristics and properties of a range of materials and evaluate the impact of their use (ACTDEK023) DesT SciT

**Living World & Material World**
- Classroom/learning space with hard floors
- Large instructor table/desk at front of room with power point close by
- Tables for students to work in groups of 4 or less
- Projector screen or smartboard that can be connected to a laptop via HDMI cord
- Access to sinks for hand washing and clean up
| **Future Pilots** (5-6) | **Working Scientifically:**  
- make and justify predictions about scientific investigations (ACSIS231, ACSIS232)  
- plan and apply the elements of scientific investigations to answer problems  
- decide which variable(s) is to be changed, measured and kept the same, in fair tests  
**Material World:**  
- investigate and compare the properties of solids, liquids and gases (ACSSU077) SciT  
**Physical World:**  
- explore and describe some common contact or non-contact forces, for example:  
  - applied force (e.g. pushing, kicking)  
  - friction and air resistance  
  - tension and elastic force  
  - gravity  
  - magnetism  
  - buoyancy  
- perform a scientific investigation to explore the effects of changing the strength of a single contact or non-contact force, for example: SciT  
  - how a stronger or weaker applied force, such as a push or kick, results in objects travelling longer or shorter distances  
  - how increasing or decreasing the strength of the force of air resistance by changing the shape of an object results in increases or decreases in speed | **Physical World** |  
- Large instructor table/desk at front of room with power point close by  
- Tables for students to work in groups of 4 or less  
- Projector screen or smartboard that can be connected to a laptop via HDMI cord  
- 2 power points, preferably near the front of the room with one on each side  
- Space in the room or covered area outside large enough to test paper planes  
- Open, grassy area outdoors |  

**Session 1:** Introducing the physics of flight  
**Session 2:** Designing a fair test for flying; exploring propellers  
**Session 3:** Designing a second fair test; rocket science