# iSTEM – Assessment advice



## Assessment

iSTEM is a department approved elective course and is not eligible for credentialing on the Record of School Achievement (RoSA).

The scheduling of assessment activities and the weightings applied should reflect the school's organisation of the course. Students should be given the opportunity to demonstrate their maximum level of achievement relative to the course performance descriptors.

## General performance descriptors

Schools may choose to use general performance descriptors to describe performance at each of 5 grade levels.

Table – Performance descriptors for the A-E grade scale

|  |  |
| --- | --- |
| Grade | Performance descriptors |
| A | The student has an extensive knowledge and understanding of the content and can readily apply this knowledge. In addition, the student has achieved a very high level of competence in the processes and skills and can apply these skills to new situations. |
| B | The student has a thorough knowledge and understanding of the content and a high level of competence in the processes and skills. In addition, the student is able to apply this knowledge and these skills to most situations. |
| C | The student has a sound knowledge and understanding of the main areas of content and has achieved an adequate level of competence in the processes and skills. |
| D | The student has a basic knowledge and understanding of the content and has achieved a limited level of competence in the processes and skills. |
| E | The student has an elementary knowledge and understanding in few areas of the content and has achieved very limited competence in some of the processes and skills. |

## Planning for assessment

All outcomes for the course are addressed in every topic allowing for flexibility in planning for assessment. In developing the assessment schedule for this course, teachers may find it useful to map each planned assessment activity to outcomes that are best achieved by that task. Determining a project for each topic at the beginning of the planning process can help guide the development of effective and authentic assessment. It is important to ensure a balance of outcomes across the assessment schedule.

iSTEM utilises problem, project, and inquiry-based learning pedagogies and these should be reflected in assessment planning. Determining what knowledge and skills you want to assess are essential to identify learning activities that meet the needs of students.

The course structure should guide the form and number of assessment activities. Combining topics and integrating content can provide greater opportunity for students to demonstrate deeper knowledge and understanding of the topics and reduce the number of assessment items required.

### Designing assessment activities

Quality assessment practice involves designing assessment activities that enable students to demonstrate their achievements and growth throughout the duration of the course, using a range of task types.

The aim of iSTEM is to engage and encourage student interest and skills in STEM, and appreciate the scope, impact and pathways into STEM careers while learning how to work collaboratively, entrepreneurially, and innovatively to solve real-world problems. Teachers should consider this aim when developing assessment items for the course.

Assessment should include criteria to clarify what aspects of learning are being assessed and enable students and teachers to use feedback effectively and reflect on the learning. In selecting and developing activities for the purpose of assessing and reporting, teachers should use a range of different approaches.

Quality assessment activities should:

* provide opportunities to gather evidence about student achievement in relation to the course outcomes
* enable students to demonstrate their understanding of STEM principles and processes and promote deeper understanding
* provide evidence of students’ attainment of practical skills, knowledge of technologies and their impact on society
* enable students to demonstrate their ability to solve problems and produce design solutions
* include the use of collaboration, creative and critical thinking skills
* foster the development of project management and entrepreneurial skills
* show connections between course activities, STEM careers and career pathways
* be inclusive and accessible, catering for the individual needs of students.

### Assessment of learning

iSTEM provides students with authentic learning contexts that simulate real-world practice. Students are expected to demonstrate evidence of their learning using processes that closely emulate real-world practice used in industry.

Students are expected to demonstrate the application of practical skills through the completion of problem-solving tasks and projects. Students need to document design processes in the completion of tasks and projects using written, verbal, or other communication strategies.

Documentation of design thinking processes could utilise, but are not limited to:

* design portfolios
* engineering reports
* scientific reports
* process diaries
* design notebooks.

Students are encouraged to share their processes using:

* pitches
* oral presentations
* podcasts
* prepared digital recordings (video or audio).

Other presentation techniques could include:

* posters
* displays
* infographics
* case studies.

Activities that engage students in inquiry-based learning, research and critical thinking are important evidence of learning in iSTEM. These might include independent and group research tasks, research assignments, critical reviews, market research, needs analysis or empathy map.

## Feedback

There are plenty of opportunities for [Assessment for, as and of learning](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/understanding-the-curriculum/assessment/approaches) in iSTEM as well as providing and receiving effective [feedback](https://education.nsw.gov.au/teaching-and-learning/professional-learning/teacher-quality-and-accreditation/strong-start-great-teachers/refining-practice/feedback-to-students). Self and peer assessment are important tools along with other strategies such as developing success criteria. When students contribute to developing assessment criteria in a meaningful way, they also typically perform at a higher level and tend to view assessments as meaningful opportunities for feedback and growth as they have a deeper understanding of its purpose.

### Peer assessment

iSTEM encourages the active involvement of students in the learning process. Opportunities exist for individual and collaborative work. Activities involving peer assessment might include evaluating the contributions of individuals to a group task and reflecting on a peer presentation.

### Self-assessment

iSTEM encourages students to become self-directed learners. Opportunities exist for students to reflect on their progress towards the achievement of the course outcomes. The completion of weekly student reflections provides the basis for improving their learning through identifying successes and areas for growth, as well as assisting in developing critical and reflective thinking skills. Developing self-assessment skills is an ongoing process that becomes increasingly more sophisticated and self-initiated as a student progresses through the course.

## Additional information

Please complete the following [feedback form](https://forms.office.com/Pages/ResponsePage.aspx?id=muagBYpBwUecJZOHJhv5kbKo2q_ZUXlHndJMnh2Wd8NUOUk0VTIzUDVVSlVFQVM5MkdOMkJGTjVKNCQlQCN0PWcu) to help us improve our resources and support.

The information below can be used to support teachers when using this assessment advice for iSTEM.

### Rationale

Australian businesses competing in a global economy will need more employees trained in science, technology, engineering, and mathematics (STEM). Research indicates that 75% of the fastest-growing occupations require STEM skills. Global accounting firm PwC (formerly known as PricewaterhouseCoopers) produced a report titled [‘A smart move’](https://www.pwc.com.au/publications/a-smart-move.html) where it found that shifting just 1% of the Australian workforce into STEM roles would add $57.4 billion to the gross domestic product (GDP) (net present value over 20 years).

iSTEM is a student-centred Stage 5 elective course that delivers science, technology, engineering, and mathematics education in an interdisciplinary, innovative, and integrated fashion. It was developed in direct response to industry’s urgent demand for young people skilled in science, technology, engineering, and mathematics.

The course was developed in collaboration with, and is supported by, industry, business, government, and universities, ensuring that students develop future-focused STEM skills. The course has a number of specialised topics, many of which are aligned with NSW State Government priority industries, identified in the [NSW Industry Development Framework](https://www.investment.nsw.gov.au/living-working-and-business/nsw-industry-development-framework/).

iSTEM develops enabling skills and knowledge that increasingly underpin many professions and trades, and the skills of a technologically enabled workforce. It provides students with learning opportunities to develop knowledge and skills to use the most up-to-date technologies including additive manufacturing (3D printing), laser cutters, augmented and virtual reality, drones, smart robotics and automation systems, artificial intelligence (AI), and a range of digital systems.

Students gain and apply knowledge, deepen their understanding, and develop collaborative, creative and critical thinking skills within authentic, real-world contexts. The course uses inquiry, problem and project-based learning approaches to solve problems and produce practical solutions utilising engineering design processes.

iSTEM is aligned to the concept of ‘[Industry 4.0](https://www.weforum.org/agenda/2019/01/why-companies-should-strive-for-industry-4-0/)’ which refers to a new and emerging phase in the industrial revolution that heavily focuses on interconnectivity, automation, machine learning, and real-time data.

iSTEM has been developed to meet the goals of National Federation Reform Council (NFRC) Education Council’s [National STEM School Education Strategy (2016-2026)](https://www.dese.gov.au/education-ministers-meeting/resources/national-stem-school-education-strategy), and supports the NSW Government’s [NSW Industry Development Framework](https://www.investment.nsw.gov.au/living-working-and-business/nsw-industry-development-framework/), the NSW Department of Education’s [Rural and Remote Education Strategy (2021-2024)](https://education.nsw.gov.au/about-us/strategies-and-reports/rural-and-remote-education-strategy-2021-24) and the [High Potential and Gifted Education policy](https://education.nsw.gov.au/policy-library/policies/pd-2004-0051).

### Aim

The aim of the course is to engage and encourage student interest and skills in STEM, appreciate the scope, impact and pathways into STEM careers, and learn how to work collaboratively, entrepreneurially, and innovatively to solve real-world problems.

### Purpose and audience

This assessment advice provides performance band descriptors which align with the A-E grading scale. It also outlines a range of assessment strategies and how they could be applied to the course. This resource is for teachers and leaders when planning for assessment and reporting of the iSTEM course.

### When and how to use this document

Use the assessment advice to guide the development of an effective assessment schedule, formative tasks, and summative tasks which allow all students to demonstrate their achievement of course outcomes. This assessment advice should also be used when designing reporting processes for the iSTEM course.

### Assessment for learning

Possible formative assessment strategies that could be included:

* Learning intentions and success criteria assist educators to articulate the purpose of a learning task to make judgements about the quality of student learning. These help students focus on the task or activity taking place and what they are learning and provide a framework for reflection and feedback. [Online tools](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/622) can assist implementation of this formative assessment strategy.
* Eliciting evidence strategies allow teachers to determine the next steps in learning and assist teachers in evaluating the impact of teaching and learning activities. Strategies that may be added to a learning sequence to elicit evidence include all student response systems, [exit tickets](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/543), mini whiteboards (actual or [digital](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/575)), [hinge questions](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/557), [Kahoot](https://app.education.nsw.gov.au/digital-learning-selector/LearningTool/Card/621), [Socrative](https://app.education.nsw.gov.au/digital-learning-selector/LearningTool/Card/587), or quick quizzes to ensure that individual student progress can be monitored and the lesson sequence adjusted based on formative data collected.
* Feedback is designed to close the gap between current and desired performance by informing teacher and student behaviour (AITSL 2017). AITSL provides a [factsheet to support evidence-based feedback](https://www.aitsl.edu.au/teach/improve-practice/feedback#:~:text=FEEDBACK-,Factsheet,-A%20quick%20guide).
* [Peer feedback](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/549) is a structured process where students evaluate the work of their peers by providing valuable feedback in relation to learning intentions and success criteria. It can be supported by [online tools](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Browser?cache_id=1d29b).
* Self-regulated learning opportunities assist students in taking ownership of their own learning. A variety of strategies can be employed and some examples include reflection tasks, [Think-Pair-Share](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/645), [KWLH charts](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/562), [learning portfolios](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/583) and [learning logs](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/564).

The primary role of assessment is to establish where individuals are in their learning so that teaching can be differentiated and further learning progress can be monitored over time.

Feedback that focuses on improving tasks, processes and student self-regulation is the most effective. Students engaging with feedback can take many forms including formal, informal, formative, summative, interactive, demonstrable, visual, written, verbal and non-verbal.

[What works best update 2020](https://education.nsw.gov.au/about-us/educational-data/cese/publications/research-reports/what-works-best-2020-update) (CESE 2020a)

### Differentiation

Differentiated learning can be enabled by differentiating the teaching approach to content, process, product and the learning environment. For more information on differentiation go to [Differentiating learning](https://education.nsw.gov.au/teaching-and-learning/professional-learning/teacher-quality-and-accreditation/strong-start-great-teachers/refining-practice/differentiating-learning) and [Differentiation](https://education.nsw.gov.au/campaigns/inclusive-practice-hub/primary-school/teaching-strategies/differentiation).

When using these resources in the classroom, it is important for teachers to consider the needs of all students in their class, including:

* **Aboriginal and Torres Strait Islander students**. Targeted [strategies](https://education.nsw.gov.au/teaching-and-learning/aec/aboriginal-education-in-nsw-public-schools) can be used to achieve outcomes for Aboriginal students in K-12 and increase knowledge and understanding of Aboriginal histories and cultures. Teachers should utilise students’ Personalised Learning Pathways to support individual student needs and goals.
* **EAL/D learners**. EAL/D learners will require explicit English language support and scaffolding, informed by the [EAL/D enhanced teaching and learning cycle](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/resources-for-schools/eald/enhanced-teaching-and-learning-cycle) and the student’s phase on the [EAL/D Learning Progression](https://education.nsw.gov.au/teaching-and-learning/curriculum/multicultural-education/english-as-an-additional-language-or-dialect/planning-eald-support/english-language-proficiency). In addition, teachers can access information about [supporting EAL/D learners](https://education.nsw.gov.au/teaching-and-learning/curriculum/multicultural-education/english-as-an-additional-language-or-dialect/planning-eald-support/english-language-proficiency) and [literacy and numeracy support specific to EAL/D learners](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/resources-for-schools/eald).
* **Students with additional learning needs**. Learning adjustments enable students with disability and additional learning and support needs to access syllabus outcomes and content on the same basis as their peers. Teachers can use a range of [adjustments](https://education.nsw.gov.au/teaching-and-learning/disability-learning-and-support/personalised-support-for-learning/adjustments-to-teaching-and-learning) to ensure a personalised approach to student learning. In addition, the [Universal Design for Learning planning tool](https://education.nsw.gov.au/teaching-and-learning/learning-from-home/teaching-at-home/teaching-and-learning-resources/universal-design-for-learning) can be used to support the diverse learning needs of students using inclusive teaching and learning strategies. Subject specific curriculum considerations can be found on the [Inclusive Practice hub](https://education.nsw.gov.au/campaigns/inclusive-practice-hub).
* **High potential and gifted learners**. [Assessing and identifying high potential and gifted learners](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/assess-and-identify#Assessment1) will help teachers decide which students may benefit from extension and additional challenge. [Effective strategies and contributors to achievement](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/evaluate) for high potential and gifted learners help teachers to identify and target areas for growth and improvement. In addition, the [Differentiation Adjustment Tool](https://education.nsw.gov.au/teaching-and-learning/high-potential-and-gifted-education/supporting-educators/implement/differentiation-adjustment-strategies) can be used to support the specific learning needs of high potential and gifted students. The [High Potential and Gifted Education Professional Learning and Resource Hub](https://schoolsnsw.sharepoint.com/sites/HPGEHub/SitePages/Home.aspx) supports school leaders and teachers to effectively implement the High Potential and Gifted Education Policy in their unique contexts.

All students need to be challenged and engaged to develop their potential fully. A culture of high expectations needs to be supported by strategies that both challenge and support student learning needs, such as through appropriate curriculum differentiation (CESE 2020a:6).

## About this resource

All curriculum resources are prepared through a rigorous process. Resources are periodically reviewed as part of our ongoing evaluation plan to ensure currency, relevance and effectiveness. For additional support or advice contact the Teaching and Learning Curriculum team by emailing [secondaryteachingandlearning@det.nsw.edu.au](mailto:secondaryteachingandlearning@det.nsw.edu.au).

**Alignment to system priorities and/or needs**:

This resource aligns to the School Excellence Framework elements of curriculum (curriculum provision) and effective classroom practice (lesson planning, explicit teaching).

This resource supports teachers to address Australian Professional Teaching Standards 5.1.2, 5.5.2

This resource has been designed to support schools with successful implementation of new curriculum, specifically the NSW Department of Education approved elective course, iSTEM © 2021 NSW Department of Education for and on behalf of the Crown in right of the State of New South Wales.

The resource is produced to assist schools with promoting and implementing the course for the first time. As the course may be taught by teachers from a range of key learning areas, the resource is designed to support teachers from a variety of KLA expertise.

**Department approved elective course**: iSTEM

**Course outcomes**: ST5-1, ST5-2, ST5-3, ST5-4, ST5-5, ST5-6, ST5-7, ST5-8, ST5-9, ST5-10

**Author**: Curriculum Secondary Learners

**Publisher**: State of NSW, Department of Education

**Resource**: Teaching resource

**Related resources**: Further resources to support iSTEM can be found on the Department approved elective courses webpage including course document, sample scope and sequences, assessment materials and other learning sequences.

**Professional Learning**: Join the [Teaching and Learning 7-12 statewide staffroom](https://education.nsw.gov.au/teaching-and-learning/curriculum/statewide-staffrooms) for information regarding professional learning opportunities.

**Universal Design for Learning Tool**: [Universal Design for Learning planning tool](https://education.nsw.gov.au/teaching-and-learning/learning-from-home/teaching-at-home/teaching-and-learning-resources/universal-design-for-learning). Support the diverse learning needs of students using inclusive teaching and learning strategies.

**Consulted with**: Aboriginal Outcomes and Partnerships, Inclusion and Wellbeing, EAL/D.

**Reviewed by**: This resource was reviewed by Curriculum Secondary Learners and by subject matter experts in schools to ensure accuracy of content.

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**Evidence Base**:

The range of assessment strategies outlined in the advice ‘encourages a variety of assessment methods each lesson to check for students’ understanding and inform what should be taught next’ (CESE 2020b:22). The assessment strategies outlined are student-centred, providing ‘students with opportunities to reflect on their progress to inform future learning goals’ (CESE 2020b:22).

The assessment advice complies with NESA’s assessment advice, outlined on NESA’s ACE website, NESA official notices and department memorandums. They:

* include statements of school procedures for allocating grades in Year 10
* set out requirements to retain student work samples to support grade allocation as required by NESA for the RoSA (NSW Department of Education 2021:7).

The assessment strategies outlined provide teachers with important information about whether students learned what they intended. Wiliam (2013:15) claims ‘the term formative should apply not to the assessment but to the function that the evidence generated by the assessment actually serves.’

## References

**Links to third-party material and websites**

Please note that the provided (reading/viewing material/list/links/texts) are a suggestion only and implies no endorsement, by the New South Wales Department of Education, of any author, publisher, or book title. School principals and teachers are best placed to assess the suitability of resources that would complement the curriculum and reflect the needs and interests of their students.

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