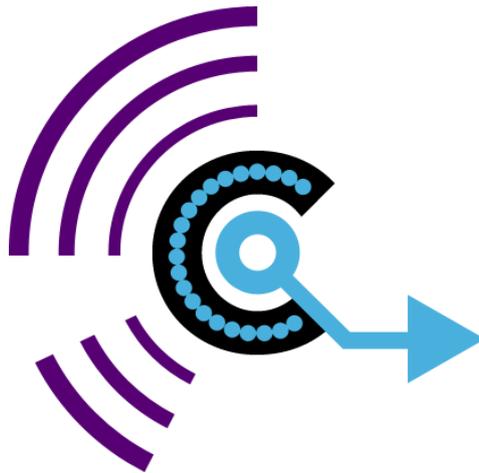


# Schools' Engineering and Technology Competition

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## Competition Rules

### Chelmsford Science and Engineering Society



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Last updated on 11 January 2019 by Adam Wood

*These rules are set by the Organising Committee of the Chelmsford Science and Engineering Society Schools' Engineering and Technology Competition, hereinafter referred to as "the committee".*

## 1 Classes of entry and prizes available

- 1.1 All projects entered into the competition shall be assessed in the **Technical Categories**, which reward high-quality and ambitious engineering, technology and science projects assessed on technical merit.
- 1.2 Any project entered that has taken place as an extracurricular STEM activity (hereinafter referred to as a "STEM club") may also be considered for the **STEM Club Award**, which rewards excellence of STEM engagement.
- 1.3 The following awards shall be up for competition:
  - (a) CSes Engineering Project of the Year Award
  - (b) CSes Concept Design Award (split by age group: see rule 2.4)
  - (c) CSes Technical Design Award (split by age group: see rule 2.4)
  - (d) CSes Design Execution Award (split by age group: see rule 2.4)
  - (e) CSes STEM Club Award, sponsored by Essex Community Foundation
  - (f) Anglia Ruskin University Award
  - (g) Lucy Pettet Innovation Award, sponsored by Leonardo
  - (h) CSes Students' Choice Award

## 2 Technical Categories Awards

- 2.1 Projects shall be assessed and scored for the following stages of the engineering lifecycle (see Appendix for details of the scoring):
  - (a) **Concept design:** the presentation of a concept or idea, and exploration of solutions to a problem in a broad but innovative manner. The projects that score highest in this area tackle ambitious problems and propose impressive, novel solutions.
  - (b) **Technical design:** the technical development of a solution using engineering process and skill. The projects that score highest in this area deliver innovative, well-thought and well-documented solutions to detailed technical problems.
  - (c) **Design execution:** the realisation of a finished product or solution. The projects that score highest in this area deliver high-quality products that are aesthetically, ergonomically and functionally accomplished, with a good awareness of target market.

### *Awards*

- 2.2 The project that scores the highest overall mark (across all three areas of assessment), and whose score is greater than or equal to the win threshold set by the committee, shall be awarded the **CSes Engineering Project of the Year Award**.

- 2.3 The project that scores the highest mark in each of the three areas of assessment listed in rule 2.1, and whose score is greater than or equal to the win threshold set by the committee, shall be awarded the corresponding technical category award:
- (a) **CSES Concept Design Award**
  - (b) **CSES Technical Design Award**
  - (c) **CSES Design Execution Award**

### *Age groups*

- 2.4 Each of the category awards listed in rule 2.3 shall be split into three or four age groups (subject to there being at least one entry in each age group):
- (a) Years **5-6**, this age group being applicable at the discretion of the committee
  - (b) Years **7-9**
  - (c) Years **10-11**
  - (d) Years **12-13**
- 2.5 The committee may, at its discretion, permit entries outside the age groups listed in rule 2.4.
- 2.6 Prizes shall be available for all applicable age groups and projects shall only be ranked against others in the same age group when determining category award winners.
- 2.7 The winner of the Engineering Project of the Year Award shall be determined from all age groups considered together. In the event of an obvious discrepancy in mark distribution for each age group, the committee may, at its discretion, apply a normalising factor in the interests of fairness.

### *Conditions for winning*

- 2.8 The winner of the Engineering Project of the Year Award, as described in rule 2.2, shall not typically be eligible for any of the category awards described in rule 2.3. In the event that the same project would win both, this project shall win only the Engineering Project of the Year Award and the project scoring the next-highest mark in the category shall be considered for the category award.
- 2.9 Similarly, in the event that a project is in a position to win multiple category awards, this project shall win only one of the category awards and the project(s) scoring the next-highest mark(s) in the other category/categories shall be considered for the other category award(s). The order of precedence determining which category award such a project shall win shall be: Design Execution, Technical Design, Concept Design.
- 2.10 The committee may, at its discretion, waive rule 2.8 or rule 2.9.

- 2.11 All projects, including those promoted into a winning position as a result of rules 2.8 and 2.9, must score a minimum number of marks to attain a winner's award. This "win threshold" shall be set by the committee.
- 2.12 As a consequence of rule 2.11, there may be categories for which there is no winner's award.
- 2.13 In the event of a tie of winning marks, all of those tied shall be considered winners for the purposes of rules 2.1 and 2.2.

### *Highly Commended awards*

- 2.14 Following the allocation of winners' awards as described in rules 2.2 through 2.13, the committee may, at its discretion, confer **Highly Commended** awards. This could be:
  - (a) for a project with a particularly high but non-winning score;
  - (b) for a project that did not win a category award due to rule 2.11; or
  - (c) to recognise particularly notable aspects of a project.

## **3 STEM Club Award**

- 3.1 The STEM Club Award assesses the overall work of a STEM club, not individual projects.
- 3.2 If a school wishes to enter the STEM Club Award, it must submit at least one project (for the Technical Categories Awards) that has taken place as part of a STEM club. Intention to enter the STEM Club Award shall be recorded on the project entry form.
- 3.3 Any school entering the STEM Club Award may also bring other non-technical work or projects that are relevant to its extracurricular STEM activity to support the club showcase. If a school wishes to do this, it must notify the committee in advance so that suitable space may be arranged.
- 3.4 Pursuant and subject to rules 5.11 through 5.13, only work that has taken place in the calendar year prior to the competition date can be considered, however the progression and development of the club and its students over a longer period shall be taken into account and looked upon favourably where demonstrated.
- 3.5 The STEM Club Award shall be awarded at the discretion of the committee's nominated judge(s) based on their assessment of each club showcase.
- 3.6 All candidates representing a club at the competition must be members of the club.
- 3.7 The STEM Club Award is to the club, not the individuals representing it, and is therefore subject to rule 5.16. The committee may, at its discretion, award further individual prizes to those who represent the winning club at the competition.

## 4 Cross-category awards

- 4.1 There shall be three cross-category awards for which all entries shall be eligible in addition to the awards described in sections 2 and 3:
- (a) **Anglia Ruskin University Award:** awarded at the discretion of representatives from Anglia Ruskin University or, in their absence, the committee's nominated judge(s).
  - (b) **Lucy Pettet Innovation Award, sponsored by Leonardo:** for the entry which, in the opinion of the committee's nominated judge(s), presents the most innovative idea, solution or technique, or makes the most original contribution to the fields of engineering, technology or science.
  - (c) **CSES Students' Choice Award:** for the entry voted best by those participating in the competition. All students entering a project shall be eligible to vote; instructions and rules shall be included on the ballot paper.
- 4.2 Any prize sponsored by an external organisation is made available at the discretion of the sponsor and may be withdrawn without notice.

## 5 General rules and conditions

### *Entrants' responsibilities*

- 5.1 All entrants are assumed to have, where necessary, the permission of their school, college or employer. A responsible adult is required to sign off each project entry.
- 5.2 The committee will take photographs at the competition and awards ceremony. These images will be made available to all participants after the event. CSES reserves the right to use these images for promotional purposes, but will not publish images with personal data. Entrants must inform the committee if they do not wish to be photographed. Please note that the press may also be in attendance.
- 5.3 A responsible adult must accompany all students; Chelmsford Science and Engineering Society cannot take responsibility for participants.
- 5.4 Entries must be substantially the students' own work: all entrants must have contributed significantly to the project(s) that they represent and may not have received inappropriate levels of assistance from a teacher or mentor etc.

### *Groups and allocation of prizes*

- 5.5 Entries may comprise individuals or teams.

- 5.6 All students representing an entry must be present at all judges' visits.
- 5.7 Each entrant may represent at most one individual project, but may be included on any number of team projects. However, candidates must bear in mind rule 5.6.
- 5.8 Prizes shall only be awarded to those who attend the competition. This rule may be waived by agreement with the committee if:
  - (a) good reason for absence is notified in advance; or
  - (b) extenuating circumstances arise on or shortly before the day of the competition.
- 5.9 The value of any prize awarded to an individual entrant is at the discretion of the committee.
- 5.10 Trophies are awarded to the school, not to the entrant(s).

### *Time limit*

- 5.11 Entries may only contain work completed in the calendar year to the competition date.
- 5.12 Where entries are on-going or have been presented before, only the elements of work completed in the calendar year to the competition date may be submitted. Candidates must be able to identify to the judges which elements are to be considered; those unable to do so may be disqualified.
- 5.13 The committee may, at its discretion, permit an entry which has been worked on within one calendar year but not the one immediately prior to the competition.

### *Geographical eligibility*

- 5.14 All educational establishments, voluntary groups and companies within the County of Essex or the Unitary Authorities of Southend-on-Sea and Thurrock are eligible for entry, and shall be considered "schools" for the purposes of this document.
- 5.15 Schools outside the Essex area, as defined in rule 5.14, are eligible for entry but ineligible for the receipt of a winner's award unless the committee, at its discretion, decides otherwise.

### *Important general rules*

- 5.16 Any prize of any intrinsic value (for example cash, vouchers or equipment) awarded to a school must be used solely to further that school's STEM activities.
- 5.17 The committee's decision is final.

## Appendix: Technical Categories scoring system

The Technical Categories system segregates projects by their level of design maturity, not technical discipline. This is considered to be fairer and less ambiguous. The project lifecycle is split into three levels of maturity (“categories”) per rule 2.1. Projects are assessed using a common scoring system that covers all phases of this lifecycle and also includes general criteria.

Criterion	Weight	Keywords
<b>Concept design</b>		
Problem definition	20%	Customer needs, problem, brief, research
Solution development	20%	Concept solutions, evaluation
Solution proposal	20%	Solution selection, refinement, evaluation, prototype
Concept creativity	40%	Scope, ambition, novel ideas, creativity, invention
<b>Technical design</b>		
Requirement capture	10%	Technical specification, test definition
Solution architecture	10%	Top-level design, partitioning, interfaces, planning
Technical development	20%	Detailed development, tools, techniques, processes, technical skill, design quality
Implementation / manufacture	20%	Planning, drawings/specification, tools, techniques, processes, quality
Integration and testing	10%	Evaluation, problem solving, further work
Technical creativity	30%	Technical innovation, skill, flair, invention
<b>Design execution</b>		
Finished product	40%	Functionality, aesthetics, ergonomics, quality, design conformance
Productionisation	30%	Production/deployment considerations, robustness/stability, snagging
Through-life support	30%	Sustainability, serviceability, disposal
<b>General</b>		
Engineering approach	33%	Systems thinking, theoretical approach, documentation, project management
Presentation	33%	Display stand quality, presentation skills, answers to questions
Discretionary marks	33%	Additional marks to credit anything not covered above (zero by default)

Please note the following:

- The lifecycle phases form a sequential workflow and it is assumed that some work must have taken place in the earlier categories in order to meet the criteria for the later ones.
- Each lifecycle category has the same maximum score (they are of equal value).
- The weightings reflect the relative contribution of each criterion and blend together aspects of process/rigour/quality and creativity/skill/ambition.
- This is an additive mark scheme: projects are expected to score zero in the aspects that are not applicable and this is not a negative reflection. Projects accrue points where possible.

The scoring is calculated as follows:

1. The judges score each assessment criterion out of 10.
2. These raw scores are multiplied by the weightings, added and normalised to give:
  - a. a score out of 40 for each lifecycle category; and
  - b. a score out of 30 for the general category.
3. One third of the general category score is added to each of the lifecycle category scores.
4. This gives a final score out of 50 for each lifecycle category (concept design, technical design and design execution).
5. The sum of these three final scores is the project's total score out of 150.