WESTERN 2024
ENGINEERING
COMPETITION

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2024

OFFICIAL RULEBOOK

Version 1.4.1

Table of Contents

1.GENERAL RULES AND DEFINITIONS

1.1.   DEFINITIONS

1.1.1. "Western Engineering Student Societies' Team" henceforth referred to as WESST, refers to the regional association of undergraduate engineering student societies in Western Canada.

1.1.2. "Western Engineering Competition" henceforth referred to as WEC, is the annual WESST activity comprising 8 competition categories.

1.1.3. "Local Competition(s)" refers to the various competitions held at each member school.

1.1.4. "Organizing Committee" refers to the team who oversees and organizes the competition as a whole.

1.1.5. "WEC Advisory Board", henceforth referred to as the WECAB, refers to the body that provides advice, guidance, and support to the WEC Organizing Committee and is the final ruling authority on issues that will affect more than one WEC.

1.1.6. "Vice Chair of Competitions" henceforth referred to as VC Competitions, or equivalent position refers to the role that oversees all the competition directors and all overarching responsibilities related to the competitions.

1.1.7. "Director" refers to the role responsible for the specific competition within a competition section of the rulebook. The director is appointed or chosen by a process set forth by the Activity Manager. The directors are the primary means of contact for competitors, judges and a liaison between the organizing committee.

1.1.8. "Rules Violation Appeals Committee" is a committee to which competitors can appeal a decision regarding (a) rule violation(s) and is defined in section 1.7 Violation of competition rules.

1.2. ELIGIBILITY

1.2.1. The VC Competitions determines the eligibility of all competitors, teams, and projects according to the following guidelines set out in this rulebook.

1.3. QUALIFICATION

1.3.1. Competitors, teams, and projects must have qualified through their local competition. To qualify, a team must place first in their category.

1.3.2. If a member school hosts multiple local competitions, any individual student may only compete in one local competition.

1.3.3. Team must be composed of members representing an active member of WESST in good standing in order to attend WEC.

1.4. COMPETITORS

1.4.1. All competitors must be enrolled in a Canadian undergraduate engineering program and at least half of the competitors making up any one team must be enrolled in an accredited undergraduate engineering program at the time of the competition except in the following cases:

1.4.2. In the cases of Innovative Design and Engineering Communications, the competitor may have graduated within a year of the competition from an accredited Canadian undergraduate engineering program and the project entered was completed before graduation. A letter will be required from the supervising professor confirming that no changes have been made to the project since the competitor's graduation. This letter must be dated no more than 30 days prior to the competition.

1.5. PROJECTS

1.5.1. Only original projects, which are the work of the competitors, may be entered. An original project is one that has not been entered in the Western Engineering Competition in previous years. The project must not have a common or obvious approach, solution, or application.

1.5.2. Work done during the course of employment related to the engineering degree is also eligible provided that an authorization letter is obtained from the employer allowing the work to be presented at the competition. The work must also meet other eligibility criteria.

1.6. REGULATION AMENDMENTS

1.6.1. These general regulations shall be considered the official regulations of WEC, an activity run by WESST. These regulations can only be amended with the approval of the current WEC Activity Manager for the WESST (current at the time of vote) and with a two-thirds vote of the

WECAB.

1.7. VIOLATION OF COMPETITION RULES

1.7.1. If a competitor is believed to have violated:
   a. A rule in this rulebook,
   b. A rule included in the problem statement given to competitors explaining their challenge, or
   c. A clarification to a rule provided by a competition director during the question period

The following process will ensure that the issue comes to a result that is fair to all parties involved.

1.7.2. Procedure
    1.7.2.1. Only the Competition Director will determine if competitor(s) for that competition are in violation of the rules.
        1.7.2.1.1. If competitor(s) are found guilty of a violation during the design phase, they will be notified immediately but will be eligible to continue the competition.

1.7.2.1.1.1. Competitors will be provided in writing the alleged violation of the rules following the design phase.

1.7.2.1.1.2. This communication of a rule violation shall not be an email or text message to ensure the competitor(s) are immediately made aware of the situation.

1.7.2.2. Following the competition, competitors have 1 hour to appeal the Competition Director's decision to the Rule Violation Appeals Committee (RVAC). The appeal must be written and clearly explain why the competitors believe they followed the rules of the competition. Appeals shall be limited to one page with size 12 font.

1.7.2.2.1. If the competitors are not found to be in violation of any rules, then the competition will continue as normal.

1.7.2.3. The RVAC shall comprise of the current Activity Manager, the VC Competitions or a designate from the current Organizing Committee, the representative from WESST, and a representative from the Organizing Committee of the following year's WEC.

1.7.2.3.1. The VC Competitions or a designate from the current Organizing Committee will act as the non-voting chair of the RVAC.

1.7.2.3.2. If there is more than one Activity Manager, then the Activity Manager(s) only receive one voting seat on the RVAC.

1.7.2.3.3. The RVAC will have 1 hour to review the appeal and vote to dismiss or hold the Competition Director's decision.

1.7.2.3.4. Competitor(s) will be immediately notified of the RVAC decision. 3.4.1. The decision of the RVAC is final, and not subject to further appeals.

1.7.2.4. In the event of discovery of a rule violation following the competition, competitor(s) will be immediately notified and have 1 hour to appeal and follow the procedure outlined in section 1.7.2.2.

2. CONSULTING ENGINEERING

The purpose of the Consulting Engineering competition is to challenge competitors to design a detailed solution to a large-scale engineering problem. The proposal must be made in a way that promotes the solution to the client (in the form of judges). Competitors must demonstrate resourcefulness while acting in good faith with the spirit of the competition.

2.1. TEAM COMPOSITION

The Consulting Engineering team will comprise at most four (4) competitors. The whole team must be representing an accredited engineering program at an active WESST member school. (For more information: http://wesst.ca/members/)

2.2. COMPETITION SUBJECT ELIGIBILITY

It is recommended that the topic incorporate more than one engineering discipline. However, while the topic should challenge competitors' technical knowledge and skills, it should also allow room for

competitors to evaluate the economic, environmental and social implications of their proposed solutions and address the requirements of the client. The winning solution may not necessarily be the most technically effective solution, but the solution that has the most real-world applicability and forethought.

Therefore, the scenario in the given topic should be one that could exist in the real world. Topics drawn from reality must be fully documented. All necessary documentation must be provided to the competitors when the problem is presented.

2.3. RESOURCES

2.3.1. FACILITIES REQUIRED

- One (1) amphitheater (presentation of problem and team presentations)
- One (1) workroom per team (design of solution)

2.3.2. PERSONNEL REQUIRED

2.3.3. JUDGES

There will be a minimum of three (3) judges for the Consulting Competition and when this number is in excess the total number of judges will be an odd number. The judges will also represent a variety of backgrounds in relation to the topic (e.g. Consulting engineering, research and sales backgrounds.)

2.3.3.1 DIRECTOR

The term Competition Director refers to the person responsible for all Consulting Competition activities and communication as selected by the WEC 2023 Organizing Committee. The Competition Director is the primary contact point between competitors, judges, and will also act as a contact between the previously mentioned groups and the WEC 2023 Organizing Committee. The competition director is responsible, along with the VC Competitions, for the design and implementation of the Consulting Engineering competition. The director must present the design problem at the beginning of the competition and answer any questions raised by competitors and judges. The director will also be there for all presentations.

Only the director may answer questions during the design period. The director will also answer any questions the judges may have during the competition.

2.3.4. OFFICIAL TIMEKEEPER

The Official Timekeeper must be responsible for enforcing time limits during the question period, solution development and presentations, as stated in the rules.

2.3.5. EQUIPMENT PROVIDED BY WEC

The following equipment will be made available to all competitors during the design phase:

A design space

- A method to submit the team presentation

- Wireless internet access
- The outlined problem and relevant background information as decided by the Competition Director

The following equipment will be available to teams during the presentation phase:

- One (1) digital projector and screen
- One (1) computer containing the team's presentation file.
- One (1) Podium

2.3.6. ALLOWED EXTERNAL RESOURCES

The competitors are allowed to bring the following equipment with them:

- Any background research conducted by team members prior to the competition
- Any electronic material stored on CDs, USB keys, disks or other storage devices
    - Please check with the organizers to make sure the format of your electronic information will be accessible using the computers provided by WEC
- Any textbooks, course notes or other reference material
- Each team member is allowed one computer

Important: Since the use of the Internet and other external resources is permitted in this competition, all information used by competitors must be referenced very carefully.

Competitors are not permitted to submit work completed by anyone other than the members of their team. If there is any evidence that competitors are submitting plagiarized work, the entire team will be eliminated from the competition and their home schools will be notified. Volunteers will monitor each team during the design process to deter teams from cheating, however, competitors are expected to act in good faith with the spirit of the competition.

2.4. PROCEDURE / TIMELINE

2.4.1. PRE-COMPETITION AND COMPETITION TIMELINE

At least seven (7) days prior to the competition, the main theme(s) of the competition will be announced to the competitors, judges and public. Assigned Team Names and exact specifications of equipment available to teams during the competition (computers, storage devices, available programs, etc.) will also be announced at this time.

2.4.2. COMPETITION

2.4.2.1 PRESENTATION OF PROBLEM

The problem must be presented to all competitors and judges at the beginning of the competition. The competition director must provide detailed explanations of what is expected from the competitors, both orally and in writing.

2.4.2.2 QUESTION PERIOD

Competitors then have fifteen (15) minutes to ask the competition director any questions. Only the time used to ask the questions (not the answers) should be counted in the fifteen (15) minutes. Time used by judges to pose questions will not be counted.

2.4.2.3 SOLUTION DEVELOPMENT

Teams will be given a maximum of eight (8) hours (at the discretion of the organizers, length to be given to competitors at least seven days in advance) to develop their solutions, produce all required deliverables, and prepare their presentations. All deliverables shall be submitted to the competition director before the end of the allotted time. Competitors may finish before the end of the allotted time.

2.4.2.4 REST PERIOD

Competitors must be allowed a minimum of eight (8) hours to rest before the presentation phase starts.

2.5. SOLUTION PRESENTATIONS

Competitors will have a maximum of twenty (20) minutes to present their solutions. All team members must be present and participate in the presentation or be penalized by judges. Judges then have a maximum of ten (10) minutes to ask questions. Presentations will be open to the public with the exception of Consulting Engineering competition teams who have not yet delivered their own presentation. Judges can ask a question at any time during the presentation. The clock should be stopped during these interruptions.

2.6. TIMEKEEPING

The following rules will be adhered to with respect to timekeeping:

2.6.1. DURING THE DESIGN PHASE
- Time is started when all the teams leave the competition briefing
- The remaining time must be announced three (3) hours, one (1) hour, thirty (30) minutes, and ten (10) minutes before the end of the allotted time

2.6.2. DURING THE PRESENTATION
- Time is halted when a judge asks a question during the presentation
- Time is halted when a team member answers a question asked by a judge
- The remaining time must be indicated to the competitors ten (10) minutes, five (5) minutes and one (1) minute before the end of the allotted time for the presentation to the judges
- A countdown presentation that is visible to both the judges and presenters must be given during the last thirty (30) seconds of the presentation

2.7. PRESENTATION ORDER

- Presentation order shall be determined randomly
- Presentation order shall be announced at least one half hour before the presentations commence.
    - ○ All teams are required to be present at this announcement
- Teams are not allowed to switch places in the presentation order

2.8. DELIVERABLES

2.8.1. FOR COMPETITORS

Each competitor will be emailed outlining the main themes of the competition seven (7) days in advance of the competition. It is the competitors' responsibility to ensure that they have received the email. Each team will receive, in hard copy, a package outlining the problem definition, design and presentation requirements, rules, marking scheme and any other information deemed necessary by the Competition Director on the day of the competition.

2.8.2. FROM COMPETITORS

Each team is required to electronically submit a technical report and presentation to the proposed problem at the end of the design phase of the competition to the Competition Director. For the purpose of determining whether or not a submission was made by the deadline, email submissions will be time stamped against the receipt time reported by the receiving email server.

The produced report is to be a maximum of ten (10) pages not including: Title Page, Table of Contents, and Appendices. All relevant calculations and references are to be included in the Appendices portion of the report. The report must be double spaced, written in Times New Roman, font size twelve (12). The report will be provided to the Judges prior to the presentation component of the competition.

The presentation format can be done in a Microsoft PowerPoint, Prezi, or another method approved by the Competition Director.

Both the technical report and presentation are to include citations of all referenced material. The reference style to be used is IEEE citation.

2.9. RESPONSE TO QUESTIONS
- Only the Competition Director or VC Competitions may answer questions during the problem presentation and design phases

- ○ Volunteers and judges may not answer questions regarding rules and procedures at any time
- During the presentation of the problem, the competition director shall answer orally and write down the answers provided
- During the design phase, only questions related to deliverable content shall be answered
  - ○ No answers shall be provided in response to questions about the problem that might lead to the development of a new approach or which might invalidate a solution
- During the design phase, answers to questions shall be provided in writing to all teams at the same time.
  - ○ A certain amount of time (e.g. 30 minutes) may be allowed to elapse or a significant number of questions accumulated before responses are provided
    - ○ A copy of the responses must be provided to the judges prior to presentation

2.10. ASSESSMENT AND JUDGING

- Judges must come from a technical background
- Judging panel will consist of a minimum of three (3) judges in total
- Presentations and assessment may be carried out in the presence of an audience in accordance with 2.5.

2.11. CONSULTING ENGINEERING JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Consulting

Solution	/55
Addresses problem Statement	/15
Scalability	/5
Real-world applicability	/15
Sustainability	/10
Year-round applicability	/5
Implementation timeline	/5
Report	**/20**
Report organization	/5
Writing style	/5
Content	/10
Presentation	**/25**
Presentation organization	/5
Confidence and presence	/5
Communication	/5
Visual aides	/5
Question responses	/5
Penalties	
Failure to address theme	-10
Insufficient Citation	-50
Absent team member	-25
Plagiarism	DQ

Total	/100

3. ENGINEERING COMMUNICATIONS

Engineering communications challenges a team of one or two competitors to describe a complicated technical process or issue in terms that the general public can understand.

3.1. TEAM COMPOSITION

The Engineering Communication team will be composed of one (1) or two (2) competitors. At least half of the design team must be representing an accredited engineering program at an active WESST-member school. Should the presenting team be a subset of a project team, the remaining members of the project team must sign a letter authorizing presentation of the project in order for it to be eligible for the competition. This letter must be submitted with the competition abstract if applicable.

3.2. TOPIC ELIGIBILITY

The topic should adhere to the following criteria:

- The topic must be technical in nature
- The presentation will assess social, environmental, political and economic ramifications of implementation
- The presentation should relate to the theme of the competition. Competitors will be informed of the theme for WEC 2024 at least seven (7) days before the start of the competition
- The work must not be copied or plagiarized from another team or source

3.3. RESOURCES

3.3.1. FACILITIES REQUIRED

- 1 Amphitheatre for presentation

3.3.2. PERSONNEL REQUIRED

3.3.2.1 JUDGES

A minimum of three (3) judges are required to assess the communication skills of the competitors. Judges in this category should have some experience with communications and public speaking. Judges are not required to have any technical engineering experience. If there are more than three (3) judges, they must be odd in number.

3.3.2.2 DIRECTOR

The competition director is responsible for the implementation of the Engineering

Communication competition. The director must be present at the presentation and available to the competitors and judges at any time for questions and requests.

3.3.2.3 OFFICIAL TIMEKEEPER

The Official Timekeeper is responsible for enforcing time limits during the presentations.

This role can be run jointly with the director.

3.3.3. EQUIPMENT PROVIDED BY WEC

The following equipment will be available for use by the competitors during their presentations:

- One (1) digital projector and screen
- One (1) computer containing the team's presentation file.
- One (1) Podium

3.3.4. ALLOWED EXTERNAL RESOURCES

Competitors are required to bring any presentation materials which they will use, including computers, pictures or diagrams and models or prototypes. Any external sources used in the presentation must be properly cited.

3.4. PROCEDURE / TIMELINE

3.4.1. PRE-COMPETITION

At least seven (7) days prior to the competition, the Competition Director will contact all teams and inform them of the competition theme.

At least three (3) days prior to the competition, the team must submit a presentation abstract. The abstract will be reviewed by the Competition Director to assess the suitability of the presentation for inclusion in the Engineering Communication competition. It will be given to the judges for information at least seven (7) hours prior to the competition. The abstracts may also be available to WEC competitors.

The abstract must describe the presentation topic in no more than two hundred (200) words. It must also state the competitor name(s), and Team Name.

3.5. COMPETITION

3.5.1. PRESENTATION PERIOD

Competitors have thirty (30) minutes to present the topic in detail, explained in terms that the public can understand. They must also present the technology's environmental, social, economic, and other impacts, and whether these impacts are positive or negative. Competitors must give a critical discussion of the technology and associated issues. Competitors who've not yet presented are prohibited from entering the presentation area until the competition director brings them in for their presentation.

3.5.2. QUESTION PERIOD

The judges then have a maximum of fifteen (15) minutes to ask questions. If time permits, the audience may also be allowed to ask questions.

3.6. TIMEKEEPING

Points will be deducted if competitors do not adhere to the time limit. The following are rules concerning timing that must be followed.

- The time must be stopped when a judge asks a question during the presentation period
- The time must be stopped while a team member responds to a question asked by a judge during the presentation period
- The remaining time must be indicated to the competitor(s): 20 minutes, 10 minutes, 5 minutes, and 1 minute before the end of the presentation
- A visual countdown must be given during the last 30 seconds of the presentation
- Teams will be penalized at –5 points/minute for under-use of time greater than 3 minutes
- Teams whose presentation exceeds 30 minutes in length will be given a 15 second grace period to finish their presentation. If their presentation is not completed after the 15 second grace period, the presentation will be terminated by the competition director.
- The timing of the question period after the presentation shall be for information purposes only.

3.7. PRESENTATION ORDER

- The order of the presentations shall be determined randomly.
- Competitors shall be informed of their presentation time at least twelve (12) hours in advance.

3.8. DELIVERABLES

3.8.1. PRESENTATION ABSTRACT

Prior to the competition, the team must submit a presentation abstract. The purpose of this abstract is for the judges and organizers to prepare. The abstract must be a maximum of two hundred (200) words describing the presentation topic. It must also state the competitor name(s) and assigned team name.

3.8.2. PRESENTATION SLIDES

Competitors must supply a soft copy (digital) of their presentation to the Competition Director at least 3 days prior to the day of the competition. The director may assign the due date at their discretion to allow time for testing the presentation and printing hard copies. These slides will be used to aid the judges in keeping notes and providing feedback when necessary and desired.

3.9. ASSESSMENT AND JUDGING

- Judges should have experience in communications.
- Judges do not require any technical knowledge on the topics being presented.
- The panel must have an odd number of judges with a minimum of three (3) judges.
- Presentations and assessment may be carried out in the presence of an audience.

- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of WEC.

3.10. ENGINEERING COMMUNICATIONS JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Communications

Introduction to topic	/20
Topic clearly presented	/5
Appropriate level of language	/5
Interest elicited by topic	/5
Accuracy of explanation	/5
Critical Analysis	**/30**
Environmental, social and economic analysis	/15
Further Analysis	/5
Quality of arguments	/10
Presentation	**/45**
Presentation organization	/10
Confidence and presence	/10
Communication	/10
Visual aides	/10
Question responses	/5
Written Abstract	**/5**
Penalties	
Failure to address theme	-10
Insufficient Citation	-50
Absent team member	-25
Plagiarism	DQ

Total	/100

4. IMPROMPTU DEBATE

Extemporaneous Debate Competitors must use analytical techniques to present, with minimum preparation, a reasoned point of view of a resolution that has not been disclosed beforehand. The goal is to assess the competitors' abilities to convey ideas and develop arguments. The purpose is not to assess competitor knowledge of parliamentary procedure and formal debating rules. Therefore, the rules normally used in debates have been modified and relaxed to enable students with no formal debate experience to take part.

The debate will be conducted in a shortened Canadian National Style debate format. It is expected that the understanding of the rules outlined in this guide are understood prior to arrival at the competition. Additional information into this debate style can be found at resources such as: https://csdf-fcde.ca/about-us/policy-documents/ .

All debates are to be open; this indicates that other competitors not currently competing can sit in and view the debates, as well as results are immediately available upon completion of judges' deliberation. Results for the final round are shared at the closing ceremony alongside other competitions.

4.1. TEAM COMPOSITION

A debate team must consist of two members. Both team members must be enrolled in an undergraduate engineering program in an active WESST member school.

4.2. RESOURCES

4.2.1. FACILITIES REQUIRED

- Amphitheater for each debate round
- Individual study rooms or lecture halls in which competitors are able to utilize to prepare impromptu rounds
- Rooms for judges' deliberation

4.2.2. PERSONNEL REQUIRED

4.2.2.1 JUDGES

A minimum of three judges per round are required to assess the problem solving abilities, proposed solution, communication skills and team dynamics of the competitors. If there are more than three judges, an odd number must be maintained. Judges in this category should come from a variety of backgrounds. It is not necessary for judges to have technical experience relating to the topic, but it is suggested that judges have knowledge and/or experience in debating. Judges can provide feedback to competitors after deliberation and upon the submission to the Director the results of the round. This feedback is required to be brief, generic, and cannot be further discussed until the end of all debate rounds. Judges are not allowed to communicate in any form to teams during the debate.

4.2.3.2 Debate Mediator/Debate Chair

The Debate Moderator, also known as the Debate Chair, is the expert in debate procedure and interpretation. The Moderator acts as an impartial judge and ensures that the rules of the debate are upheld at all times during the competition. They are to ensure that the judges understand the rules of debate prior to the first round, and that they are prepared to meet all expectations during the competition.

The duties of the Chair also extend to moderate the debate by ensuring that all rules are upheld at all times during the course of the competition. They grant the right to speak (introduces the debater) and enforces the time limits. Most importantly, the Chair makes rulings on the "points of procedure" put forward by the competitors during the debate rounds. The decisions of the Chair are final and must be followed. An appeal of any rulings can be made at the end of the round under the supervision of the Vice Chair Competitions or an equivalent.

4.2.2.3 Timekeeper

The Timekeeper - who oftentimes is a role also undertaken by the Chair - is responsible for ensuring that competitors stay within their allotted time limits. They are required to inform speakers of specific time intervals for each speaking period as outlined.

The Timekeeper will use hand signals to indicate the number of minutes a speaker has left to conclude their argument. They will also give a fifteen (15) second final countdown also communicated via predetermined hand motions. If a member of the debater team knocks on the table during the final fifteen (15) seconds, the Timekeeper will permit an extra, and final, fifteen (15) seconds of grace. If a question is asked to the speaker by the opposing team during protected time, the Timekeeper will indicate this to the Chair so that it can be stopped.

4.2.3. EQUIPMENT PROVIDED BY WEC

The following equipment will be made available during the debates:
- Two (2) tables, with two (2) chairs each in Canadian National style format
- Podium for the presenting speaker

4.2.4. EQUIPMENT PROVIDED BY WEC (Online) One (1)
online meeting room for presentation

4.2.5. ALLOWED EXTERNAL RESOURCES

External resources such as stopwatches, writing pads and other tools are allowed at the discretion of the debate mediator and judges. Props and any other external resources except those expressly mentioned previously are prohibited.

4.3. DEBATING RULES AND ELEMENTS

4.3.1. Teams

The debate is between two teams, each with two members. The government will be given the task of presenting an initial set of ideas and arguing their validity. The opposition will then proceed to show how these ideas are undesirable and a possible detriment to society if implemented. Before the resolution is revealed, a coin toss is held in which the lowest seed team is given the right to declare. The team that wins the toss gets to pick the side that they would like to represent. Teams are always expected to act responsibly. Inappropriate language or offensiveness towards the other team, the officials, or the audience is not acceptable. Teams are expected to direct all their speeches towards the Chair; conversations between the two teams during the debate rounds are expressly forbidden.

4.3.2. Resolutions

The resolutions will be assigned by the organizing committee and will be validated by the Debate Chairs before the competition begins. They will be related to an issue that the average engineering student should have a defensible opinion on without any preparation. The resolutions will not be truisms. Absolute words such as "all," "everyone," and "always" will also be avoided (e.g. "Be it resolved that all engineers are good at math" is not a good resolution, since there are always exceptions). Once both teams are informed of the resolution, they are given fifteen minutes to prepare for the debate.

4.3.3. Time allotted to Debaters

The speaking order and times will be as follows:

- First speaker of the government: 5 minutes
- First speaker of the opposition: 5 minutes
- Second speaker of the government: 5 minutes
- Second speaker of the opposition: 5 minutes
- Rebuttal by the first speaker of the opposition: 2 minutes
- Rebuttal by the first speaker of the government: 2 minutes

If a debater is over the time limit, the Chair will allow a fifteen (15) second grace period under the specifications above mentioned. Upon the exhaustion of speaking time, loud pounding on tables will be deemed appropriate by either the opposing team, Chair, and/or audience members. Judges are to dismiss any comments made after the conclusion of the grace period at the discretion of the Chair.

4.3.4. Role of the Government

The government must open the debate by defining its terms as presented in the "This House Believes That" (THBT) statement. This allows for the scope of the debate to be narrowed to one major topic that clearly outlines the proposition and opposition cases. The resolutions must not be squirreled or converted into truisms.

Squirrelling is the act of defining the resolutions so that the meaning is different than the one intended in its presentation. Judges will be briefed on the impact and consequences of squirreling where significant alterations to the theme of the debate will be taken in favour of the team in which the act of squirreling was imposed. The government must also avoid specific knowledge debates or arguments in which the average person has no familiarity with the topic. The government can follow one of two different strategies in the debate:

4.3.5. The Principal Case

In a principle case, the government presents a principle and a contention. The principle is a general statement that is debatable based on facts, experience, or morals. Examples include "engineers need to be well rounded" and "Canadians abuse the free health-care system." The contention is the application of the principle to a situation relating to the resolution. The contention must be about one major topic and may be a restatement of the resolution. Example contentions for the above principles would be: "Engineering students should be required to take more complementary studies classes" and "People should be discouraged from going to a doctor unless necessary."

4.3.6. The Plan Case

In a plan case, the government still identifies a principle and a contention. Once this is done, they present a plan for implementing the contention and changing the status quo. They must identify the need for change and how the plan will induce this change. Example plans for the above contentions would be: "Students should be required to take two years of general studies before entering an engineering program" and "Individuals should be charged a fee every time they visit a doctor." The plan case is the most effective when the principle and contention are almost non-debatable. For example, if the resolution is "Be it resolved that waste management should become more stringent," the contention is almost unquestionable. However, the proposition can intensify the debate by adding, "Thus, we propose that any household that produces more than a certain quota of waste be severely fined." In a plan case, it is important that the plan does not become too specific since preparation time is limited and the technical knowledge necessary to develop the plan is non- existent.

4.3.7. The First Speaker

The first speaker of the government must explain the interpretation of the resolution, clearly state the principle and contention, and clarify any definitions. If a plan case is introduced, the entire plan must be outlined in the first speaker's speech. Finally, the first speaker must initiate the argumentation for the contention and plan.

4.3.8. The Second Speaker

The second speaker of the government continues the argumentation of the first speaker and reaffirms concepts that have been attacked by the opposition. New parts of a plan may not be introduced and terms in the resolution may not be defined. New lines of argumentation and new evidence, however, may be introduced.

4.3.9. Role of the Opposition

The opposition's task is to convince the judges that the government's views are fallacious. If the case presented by the government is a truism or requires specific knowledge to debate, the opposition can point this out in their first speech and will be rewarded accordingly by the judges. If the point is well taken, then the opposition must redefine the resolution in a debatable manner. If the government presents a principle case, the opposition is left with little more to do than attack the principle. If the government presents a plan case, the opposition can attack the principle, the contention or the

arguments for the plan. The opposition can also show how the plan will not work or identify the undesirable side effects that it will create.

Finally, the opposition may propose a counter plan that is more effective than the original plan. The first speaker of the opposition must introduce counter plans.

4.3.10. Rebuttals

In the rebuttals, the most prevalent elements of the debate must be summarized in a concise and convincing manner. Excluding the first rebuttal of the opposition, no new arguments or facts may be presented unless they directly refute what has already been discussed.

4.3.11. Points of Information

Questions are a secondary means of refuting arguments, also known as "Points of Information" (POIs). They can promptly point out deficiencies in ideas or allow for the current speaker to misrepresent their arguments. The debater who currently holds the floor has the authority to take or ignore questions. Debate teams who accept an adequate number of POIs, and answer them in a convincing manner that helps construct their arguments, are to acquire points during the round. Provided that the opposing team makes an honest attempt at offering POIs (an honest attempt is at least two attempts in one speech), the current speaker is expected to accept at least one.

The opponent who wishes to ask a question indicates their desire by standing up and extending an open palm forward. If the debater does not wish to take the question, they can so indicate by a wave of the hand or a simple "no, thank you." If this occurs, the inquiring party must sit down. If the current debater wishes to entertain the question, it must be stated by the opponent in less than 15 seconds during which the speaker must yield the floor.

Only the current speaker of the debate team may answer the question, though the point can be brought by the other teammate during their respective speaking time. The time used to ask and answer the question comes out of the current debater's allotted time. Questions will not be allowed in the first or last minute of a speech, or during rebuttals; these restrictions are known as "Protected Time". If a POI is asked during Protected Time, the speaker can ignore the question or call a Point of Procedure.

4.3.12. Heckling

Often, the speaker can contradict themselves or make an absurd assumption. Heckling at this time will point out the error and add to the debate. Heckling is acceptable if it is short, to the point, and preferably witty. If excess heckling becomes disturbing to the overall debate, inappropriate, or offensive, the Chair may intervene

4.3.13. Points of Procedure

 If a team believes that one of the rules of the debate have been broken, they must immediately alert the Chair of the violation by standing and saying, "Point of Procedure". The Chair will instruct the Timekeeper to pause the time and then respond with, "make your point". The team will then proceed to explain how the debate rules have not been followed in a brief statement. Based on the presented findings, the Chair will rule on the point by saying, "point well taken" or "point not taken." If it is obvious

that the Chair is incorrect, the team should not argue with the Chair, but expect the judges to compensate for the Chair's shortcomings. The time it takes to rise and rule on a point is not included in the speaking time of the team currently debating. The following are violations that warrant a point of procedure:

- unprofessional behavior;
- undue heckling;
- offensive behavior;
- misquotations;
- speaking to the opposition instead of the audience;
- presenting new arguments in the rebuttal; and ● introduction of parts of a plan by the second speaker.

The purpose of the point of procedure is to highlight an unfair statement that misrepresents the team's statements. As such, this is to be utilized in moderation and to point out these pitfalls to the judges and moderator for consideration in the awarding of points. Points of Procedure are to only be considered under the discretion of the Chair.

(*If the government has presented a truism or specific knowledge case, the opposition must wait until the end of the first debater's speech to point this out.) Moreover, if the officials have failed to follow the rules of debate (incorrect speaking order, too much speaking time allowed, etc.), it may be politely pointed out to them with a Point of Procedure. Points of Procedure are commonly seen to detract from a debate when offered incorrectly. Points of procedure which take away from the flow of a debate unnecessarily will be penalized by the judges.

4.4. PROCEDURES/TIMELINE

4.4.1. Pre-Competition

These rules are to be made available to all competitors and judges at least 1 month prior to the competition.

A competition briefing will be held before the commencement of the competition and should include the debate moderators/chairs, timekeepers, Competition Director, VC Competitions, judges and competitors. The debate moderators/chairs will run the briefing and review the rules, tips and expectations for the debates. The purpose of the briefing is to ensure that all rules and procedures are understood by judges and competitors, and will not reveal the debate topics. There is no timeline for this briefing and questions may be fielded at the discretion of the debate moderators and Competition Director.

4.4.2. Presentation Order

The debate schedule will be prepared at random and presented at the pre-competition briefing (at least thirty (15) minutes prior to the first debate). This schedule will remain visible and updated systematically throughout the Debates competition. The schedule should also illustrate the path which a team will follow depending on wins and losses.

4.4.3. Double Elimination

The debate competition will follow a double elimination format which ensures all teams will get to participate in at least 2 debates. The competition begins with matches between randomly assigned pairs of teams. Once each team has debated once, the losers from the matches will face each other in a second "tree". (Note, in the case of an odd number of teams, all but one team will debate before the second tree commences.) The debates then proceed in the same format with the first tree being those teams that have not lost a match, and the second tree for those that have lost a single match. Once a team has lost 2 matches, they are out of the competition. The final match is between the top teams from each tree, and the third place team is the one with the most wins that did not make it to the final.

Teams may have to debate two or more times in a row, due to the dynamic nature of the format, however the Debate Director should do their best to ensure teams are given reasonable breaks between debates. Double elimination is used to ensure a minimum level of team participation, therefore if a team proceeds unbeaten until the final round, only to lose to another team, there will not be an additional final debate.

4.5. ASSESSMENT AND JUDGING

4.5.1. Judging

The debate is judged based upon the most convincing argument, communication skills, and ability to follow outlined procedures. Each judge will decide individually, and the debate chair will tally the decisions and announce the winner. The winning team will then move to the next round.

Judges will regard the following characteristics to help determine the overall result of the debate:

- Persuasiveness of arguments presented during the debate (Within their agreed upon definitions, was one side's arguments and presentation more convincing?);
- Relevance of offered POIs and their responses (Did each side understand the other and address their arguments?);
- Presentation and speaking style of communicated motions; and ● Ability to follow rules presented within this manual.

4.5.2. IMPROMPTU DEBATE JUDGING MATRIX

Speakers will be awarded points individually, though the winning tally will be based on the team's ability to convince the judges to align with their arguments. Scorecards in which will be utilized by judges to help guide their decision will align with the following.

Actual Matrix TBD

5. INNOVATIVE DESIGN

The innovative design competition is prepared entirely outside the realm of the Western Engineering Competition. Competitors choose their own topic, prepare research and develop a design. The designs must be new and innovative and address a void in society.

5.1. TEAM COMPOSITION

The Innovative Design team will be comprised of one (1) to four (4) competitors.

Should the presenting team be a subset of the project team and plan to use the team project for the competition, the remaining members of the project team must sign a letter authorizing presentation of the project in order for it to be eligible for the competition. However, it is encouraged for all team members to present with equal participation.

5.2. TOPIC ELIGIBILITY

The topic should adhere to the following criteria:
- The project must be technical in nature
- The project must have a design component
- The project must assess the social, environmental and economic ramifications of product design
- The work must not be copied or plagiarized from another team or source

While the above list provides a guideline to project selection, no projects will be disallowed due to the topic selection. The judging criteria provide a component that analyzes the applicability of the project's topic.

5.3. RESOURCES

5.3.1. FACILITIES REQUIRED

An exhibition hall is required to allow competitors to set up displays and perform presentations for the judges. This hall should be in a central location and must be open to the public during the competition.

5.3.2. FACILITIES REQUIRED (ONLINE)
- One (1) online meeting room

5.3.3. PERSONNEL REQUIRED

5.3.3.1 JUDGES

The judging panel will consist of an odd number of judges, with a minimum of three (3) in total.

5.3.3.2 DIRECTOR

The competition director is responsible for the logistics and implementation of the Innovative Design competition. The director must be available to competitors and judges at any time for questions and requests. The director should also be present at all presentations when possible or have someone equivalent take their place.

5.3.3.3 OFFICIAL TIMEKEEPER

The Official Timekeeper must be responsible for enforcing time limits during the question period, solution development, and presentations, as stated in the rules. This role can be run jointly with the director.

5.3.4. EQUIPMENT PROVIDED BY WEC

The following equipment will be made available to all competitors during the competition time period:

- One (1) table
- Electrical power supply for each team, if necessary
- Internet Source

5.3.5. ALLOWED EXTERNAL RESOURCES

There is no restriction on the resources which competitors are allowed to bring to the competition. A list of resources must be provided to the Competition Director in accordance with the "Pre-Competition Procedure/ Timeline".

5.4. PROCEDURE / TIMELINE

5.4.1. PRE-COMPETITION

5.4.1.1 20 Days Prior Competition Brief

- A one-page competition brief, detailed in Section 5.7. (Deliverables)

Announcement of Constraints

- Space constraints and other logistical constraints must be described to the competitors (maximum display dimensions, maximum display height, use of flammable or dangerous products prohibited,etc.).
- Location where all display material, models and equipment will be shipped to and stored must be announced.

5.4.1.2 10 Days Prior Layout and Specific Needs

Competitors must convey the following information to the Competition Director:

- Any specific needs (layout, electrical, power supply, etc).
- A sketch of the anticipated layout, including placement of the display board and any equipment or models.
- The planned shipping modes of displays or equipment including arrival time.

5.4.1.3 Morning of Set-up

Competitors set up their displays the morning of the display. Compliance with the dimension constraints are checked at the same time.

Competition Briefing

- The Director will host a competition briefing, attended by the competitors and judges, where details of the competition timeline and judging structure are discussed. There will be time allowed for questions.

- At the briefing, each team will be asked for a copy of their presentation handouts (Section 4.4.5)

5.4.2. COMPETITION PUBLIC OPENING

The exhibitions are open for visits from the general public. Competitors must staff their displays for a minimum of three (3) hours. Judging periods are to be indicated during the competition briefing.

Judging

The judges, either individually or in groups of two, will walk among the displays during the judging period. The competitors may give up to a twenty (20)-minute presentation, followed by a ten (10)-minute question period, at their displays. They must use only the resources at their display to illustrate their work.

Competitors will be required to give their presentation more than once as each judge must see all displays, but not at the same time.

5.5. TIMEKEEPING

The following rules govern timekeeping:

- Time is not halted when a judge asks a question during the presentation

- The remaining time must be indicated to the competitors ten (10) minutes, five (5) minutes, and one minute before the end of the allotted time for the presentation

- A visual countdown must be given during the last thirty (30) seconds of the presentation

- Presenters will be asked to stop their presentation if they exceed 20 minutes.

- Time to both ask and answer questions during the question period is counted.

5.6. PRESENTATION ORDER

Presentation order will be chosen and presented at the competition briefing. The order will be selected at random, adhering to the following criteria:

- The judges may view the presentations either individually or in pairs

- Competitors will be required to give their presentation more than once

- The order should allow all the judges to visit all the displays

- The order shall prevent the judges from visiting the displays in the same order

5.7. DELIVERABLES

Deliverables are due to the judges by the beginning of the judging period on Competition Day, unless noted otherwise.

5.7.1. DESIGN SUMMARY

Prior to the competition, the team must submit a design summary. The purpose of this summary is for the judges and organizers to be prepared ahead of time with regards to the topics being presented. This summary will follow conventional formatting characteristics (12-point font, 1.5 line spacing, 1" paper margins) and is limited to one (1) page. The summary must include, but is not limited to:

- Team Name
- Team Members
- Design topic and description

5.7.2. PRESENTATION HANDOUTS

If a slideshow presentation is to be utilized, a hard copy of all slides may be prepared for each judge.

5.8. ASSESSMENT AND JUDGING

- Judges must come from a technical background
- Judging panel will consist of a minimum of three (3) judges in total

5.9. INNOVATIVE DESIGN JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Innovative Design

Solution	/60
Design Justification	/15
Environmental, social and economic feasibility	/15
Technical Feasibility	/15
Comercial Feasibility	/15
Presentation	**/30**
Presentation organization	/10
Confidence and presence	/5
Communication	/5
Visual aides	/5
Question responses	/5
Design Summary	**/10**
Penalties	
Insufficient Citation	-50
Absent team member	-25
Plagiarism	DQ

Total	/100

6. JUNIOR DESIGN

This competition challenges junior (first or second year) engineering students to design and build a prototype to address a technical problem. The Junior Team Design category is similar to that of Senior Team Design, but emphasis is placed on prototype functionality rather than design theory.

6.1. TEAM COMPOSITION

The design team must comprise a maximum of four competitors. The entire team must be enrolled in their first (1st) or second (2nd) academic year of a WESST member school. Academic year definitions will be in agreement with the competitor's school's definition, typically based on the number of credits/units completed.

6.2. RESOURCES

6.2.1. FACILITIES REQUIRED
- One (1) Amphitheater (presentation of problem and team presentations)
- One (1) large workroom, subdivided with partitions for each team or one (1) separate workroom per team
- One (1) space for supplies "store"
- One (1) centralized competition presentation/testing space (location will depend on the constraints of the design problem)

6.2.2. FACILITIES REQUIRED (Online)
- One (1) online meeting room

6.2.3. PERSONNEL REQUIRED

6.2.3.1 JUDGES

A minimum of three (3) to a maximum of five (5) judges are required to assess problem solving abilities, efficacy of solution and team dynamic (work ethic, cooperation, etc.) of the competitors. Judges in this category do not require a technical background in engineering, however an understanding of effective presentation techniques and other engineering 'soft' skills is an asset.

6.2.3.2 DIRECTOR

The Competition Director is responsible, along with the VC Competitions, for the entire design and implementation of the Junior Design competition. The Director must present the design challenge at the beginning of the competition and answer applicable questions. Only the director may answer questions during the design period. The Director will also answer any questions the judges may have throughout the competition.

6.2.3.3 OFFICIAL TIMEKEEPER

The Official Timekeeper is responsible for enforcing time limits during the competition and presentations. This role may be run jointly with the Director.

6.2.4. EQUIPMENT PROVIDED BY WEC

The following will be made available to all competitors during the design phase:

- A design area with at least one table, four chairs and any other tools or equipment that will be provided by WEC

- Paper and pencils/pens for writing

- Any materials and/or tools specific to the design problem

- Power source if powered tools supplied

The following equipment will be available to teams during the presentation phase:

- 1 table

- Whiteboard(s) or blackboard(s)

- Projector(s)

6.2.5. ALLOWED EXTERNAL RESOURCES

Absolutely no external resources are permitted entry or use during the Junior Design challenge. Competitors are prohibited from using the internet, contacting a third party, or bringing in previously gathered material or information. This includes the use of all laptop computers, cell phones, tablets, or any other communication device in regard to advancing themselves in the competition. Violations may result in disqualification at the discretion of the Competition Director.

6.3. PROCEDURE / TIMELINE

6.3.1. PRE-COMPETITION AND COMPETITION TIMELINE

At least seven (7) days before the competition, information about the rules of the competition will be sent to all competitors. A detailed competition timeline will also be provided as well as any background information which may be deemed necessary by the Competition Director.

6.4. COMPETITION

6.4.1. PRESENTATION OF CHALLENGE

The problem will be presented to all competitors and judges at the beginning of the competition. The Competition Director will provide a detailed explanation of what is expected from the competitors both orally and written.

6.4.2. QUESTION PERIOD

There will be a fifteen (15) minute question period during which time the competitors may ask the Competition Director any questions they may have. Only time used to ask questions should be counted. The answers will be provided orally and recorded in written form.

Competitors are allowed to ask questions during the solution development time as well. Questions will be recorded by the competition director and the answers will be made available to all competitors.

6.4.3. SOLUTION DEVELOPMENT

Teams will be given four to eight hours to develop their solution, produce all required deliverables, and prepare their presentation for the judges. All deliverables must be submitted before allotted time expires. Competitors may finish early.

Deliverables must be submitted before a team is permitted to leave the competition area. All submissions are final.

6.4.4. REST PERIOD

Competitors will be given a minimum of thirty (30) minutes rest period before being required to present and test their design.

6.4.5. PRESENTATION AND TESTING

Competitors have five (5) minutes to present their design. All team members must be present and participate in the presentation or be penalized by judges. The original design, its rationale, design process, and a critique of the prototype are required presentation components. The Judges then have up to ten (10) minutes to ask questions.

Each team will then carry out a set number of tests of their design. The number and length of tests must be dictated by the Competition Director during the presentation of the problem. The testing may be carried out at the discretion of the Competition Director.

6.5. TIMEKEEPING

- Time is halted when a judge asks or answers a question while the problem is being presented.
- Only the time used to ask questions during the question period is counted, not the time used to answer questions.
- Time for the solution development period is started when all the teams have reached their work areas
- The remaining time for solution development must be announced 2 hours, 1 hour, 30 minutes, and 10 minutes before the end of the allotted time.
- The remaining presentation time must be indicated to the competitors 2 minutes and 1 minute before the end of the allotted time.
- A visual countdown must be given during the last 30 seconds of the presentation to the judges.
- After the 5-minute presentation time, the competitors will have a 15 second grace period to conclude their presentation before they are cut off to begin the question period.

6.6. PRESENTATION ORDER

- Presentation order shall be determined randomly.

- Presentation order shall be announced thirty (30) minutes before the presentations to the judges commence. All teams are required to represent themselves at this announcement.
- Teams are not allowed to switch places in the presentation order.

6.7. DELIVERABLES

- Each team is required to submit a prototype before the end of the design period. This will be used to test the teams' solution to the design problem.
- No report or presentation material are required for the Junior Design competition.
      Teams may choose to use visual aids in their presentation, however emphasis is placed

on explanation of design and functionality of prototype. This is reflected in judging criteria.

6.8. RESPONSE TO QUESTIONS

- Only the Competition Director may answer questions during the problem presentation and design phases. Volunteers and judges may not answer questions regarding rules or procedures at any time.
- During the presentation of the problem, the Competition Director shall answer orally and write down the answers provided.
- During the design phase, only questions related to deliverable content shall be answered. No answers shall be provided in response to questions about the problem that might lead to the development of a new approach or that might invalidate a solution.
- During the design phase, answers to questions shall be provided in writing to all teams at the same time. A certain amount of time (e.g. 15 minutes) may be allowed to elapse or a significant number of questions accumulated before responses are provided. A copy of the responses must be provided to the judges prior to the presentations.

6.9. ASSESSMENT AND JUDGING

- Judging panel will consist of a minimum of three (3) judges in total
- Presentations and assessment may be carried out in the presence of an audience
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of WEC.

6.9.1. JUNIOR DESIGN JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Junior Design

Design	/30
Prototype quality	/10
Innovation and Creativity	/10
Use of resources	/10
Testing	**/40**
Presentation	**/30**
Design process	/5
Design justification	/5
Presentation	/10
Delivery	/5
Question answers	/5
Penalties	
Absent team member	-25
Plagiarism	DQ

Total	/100

7. PROGRAMMING

The Programming Competition challenges competitors to create a program which solves the presented problem.

7.1. TEAM COMPOSITION

The Programming team will comprise between two (2) and four (4) competitors. The whole team must be representing and enrolled in an accredited engineering program at an active WESST member school.

7.2. RESOURCES

7.2.1. FACILITIES REQUIRED
- One (1) Amphitheater (presentation of problem and presentations)
- One (1) workspace for each team (development of program and presentation)

7.2.2. PERSONNEL REQUIRED

7.2.2.1 JUDGES

There will be a minimum of three (3) judges for the Programming Competition and when this number is in excess the total number of judges will be an odd number. The judges are required to assess the problem-solving ability, prototype quality and design skill, and team dynamics of the competitors. Judges in this category should have some technical engineering experience, with experience in coding being an asset.

7.2.2.2 DIRECTOR

The competition director is responsible for the design and implementation of the Programming competition. The director must present the design problem at the beginning of the competition and answer any questions raised by competitors. Only the director may answer questions during the design period. The director will also answer any questions the judges may have during the competition.

7.2.2.3 OFFICIAL TIMEKEEPER

The Official Timekeeper is responsible for enforcing time limits during the question period, solution development and presentations, as stated in the rules.

7.2.3. RESOURCES PROVIDED BY WEC

7.2.3.1 DESIGN PERIOD

The following resources will be made available to all teams during the design phase: ● A private workspace with at least one (1) table and four (4) chairs
- Internet access
- Electrical power supply for each team

7.2.3.2 PRESENTATION PERIOD

The following resources will be made available to all teams during the presentation phase:
- One (1) digital projector and screen
- One (1) computer containing the team's presentation file.
- One (1) Podium
- One (1) Laser pointer

7.3. RESOURCES NOT PROVIDED BY WEC

7.3.1. REQUIRED RESOURCES

Each team must have competitor owned computer(s) or laptop(s) with legal copies of developmental software are required.

Programming languages are restricted to the following: Assembly, C, C++, Objective-C, C#, Java, JavaScript, Python, Ruby, Perl, VB, VHDL, Lisp, MatLab, Haskell, SQL, PHP, HTML, Typescript.

There are no restrictions on compilers.

7.3.2. ALLOWED EXTERNAL RESOURCES

Teams may bring the following resources to the competition:

- Any background research conducted by team members prior to the competition
- Any electronic material stored on CDs, USB keys, disks or other storage devices
- Any textbooks, course notes or other reference material
- Each team member is allowed one computer

7.3. PROCEDURE / TIMELINE

7.3.1. PRE-COMPETITION AND COMPETITION TIMELINE

At least seven (7) days (168 hours) prior to the competition, the main theme(s) of the competition will be announced to the competitors, judges and public.

7.3.2. COMPETITION

7.3.2.1 PRESENTATION OF PROBLEM

The problem will be presented to competitors at the beginning of the competition. The competition director will provide detailed explanations of what is expected of competitors, both orally and in writing.

7.3.2.2 QUESTION PERIOD

Upon hearing the problem description, fifteen (15) minutes will be allotted for competitors to ask questions pertaining to the competition. The competition director will do their best to answer these questions. Any questions posed during this period will later be made publicly available, along with their answers, to all competitors.

7.3.2.3 SOLUTION DEVELOPMENT

Teams will have a maximum of eight (8) hours (Total time is at the discretion of the organizers, length to be given to competitors at least seven days in advance) to develop their solutions, prepare their presentation, and produce all required deliverables. Teams must submit their deliverables to the competition director any time before the end of the solution development period, or they may be disqualified.

7.3.2.4 REST PERIOD

Teams will have at least eight (8) hours of rest in between the end of the Solution Development phase and the beginning of presentations.

7.3.2.5 PRESENTATION AND PROTOTYPE DEMONSTRATION

Each Competitors will have twenty (20) minutes to present their solutions. All team members must be present and participate in the presentation or be penalized by the judges. Judges then have ten (10) minutes to ask questions. Judges can ask a question at any time during the presentation. The clock should be stopped during these interruptions.

7.4. TIMEKEEPING

7.4.1. SOLUTION DEVELOPMENT

The solution development time shall be started when all teams have reached their workspace after the question period has concluded. The remaining time will be announced when three (3) hours, one (1) hour, thirty (30) minutes, fifteen (15) minutes, and five (5) minutes are remaining.

7.4.2. PRESENTATION AND TESTING PHASE

The total presentation and demonstration time allotted to each team is thirty (30) minutes starting promptly at each team's scheduled time. If thirty (30) minutes has elapsed, the scheduled team must end their presentation or prototype demonstration immediately. The fifteen (15) minute presentation and demonstration time will start when teams initiate their presentation. The remaining time will be indicated to presenters when five (5) minutes and one (1) minute are left in the presentation time. A visual countdown will be made available to competitors when thirty (30) seconds are remaining. Teams are allowed five (5) minutes to set up.

The ten (10) minute question time will start as soon as the fifteen (15) minute presentation time has elapsed, or when presenting teams have finished their presentations, whichever occurs first. Judges will not be permitted to ask questions once the question time has elapsed.

7.4.3. PRESENTATION ORDER

- Presentation order shall be determined randomly.
- Presentation order shall be announced at least two hours before the presentations commence.
- Teams are not allowed to switch places in the presentation order, unless there is an emergency. If an emergency arises the competition director must be notified as soon as possible.

7.5. DELIVERABLES

7.5.1. For the Competitors

Each team member will electronically be given access to a package outlining the main themes of the competition seven (7) days in advance of the competition. It is the competitor's responsibility to ensure

that they have received the package. At the start of the competition briefing, each team will receive an email that will contain a package describing the problem definition, the design and presentation requirements, the rules, the marking scheme and any other information deemed necessary by the director.

7.5.2. From the Competitors

Prior to the end of the design period, each team is required to submit all deliverables outlined by the problem, via USB. There will be a drop-off point in a neutral location, where teams must deliver their USB prior to the end of the design period.

7.6. RESPONSE TO QUESTIONS

- Only the competition director may answer questions during the problem presentation and design phases. Volunteers and judges may not answer questions regarding rules and procedures at any time.
- During the presentation of the problem, the competition director shall answer orally and write down the answers provided.
- During the design phase, only questions related to deliverable content shall be answered. No answers shall be provided in response to questions about the problem that might lead to the development of a new approach or which might invalidate a solution.
- During the design phase, answers to questions shall be provided in writing to all teams at the same time. Fifteen (15) minutes may be allowed to elapse for a significant number of questions accumulated before responses are provided. A copy of the responses must be provided to the judges prior to the presentations.

7.7. ASSESSMENT AND JUDGING

- Judges must come from a technical background
- Judging panel will consist of a minimum of three (3) judges in total
- Presentations and assessment may be carried out in the presence of an audience
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of WEC

7.7.1. PROGRAMMING JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Programming

Design Quality	/70
Topic clearly presented	/20
Appropriate level of language	/15
Interest elicited by topic	/15
Accuracy of explanation	/10
Presentation	/30
Presentation organization	/10
Confidence and presence	/5
Communication	/5
Visual aides	/5
Question responses	/5
Penalties	
Reported bugs/issues	-5/per
Unreported bugs/issues	-20/per
Failure to address theme	-10
Insufficient Citation	-50
Absent team member	-25
Plagiarism	DQ

Total	/100

8. RE-ENGINEERING

Re-engineering is the act of taking an existing engineering concept, product, technique, or technology and incrementally improving on its design to suit an alternate situation or application. In this competition, students will be required to apply the re-engineering process to an existing gadget or mechanism in order to add new functionality to it or enhance its original functionality. The intent of these improvements will be to extend the use of the device to an alternative situation or use case.

8.1. TEAM COMPOSITION

The Re-engineering team will be comprised of one (1) or two (2) competitors. The whole team must be representing an accredited engineering program at an active WESST member school.

8.2. RESOURCES

8.2.1. FACILITIES REQUIRED

- Amphitheater for the presentation phase
- One (1) workroom per team for the design phase

8.2.2. PERSONNEL REQUIRED

8.2.2.1 JUDGES

An odd number and minimum of three (3) judges will assess the problem-solving abilities, proposed solution(s), creativity, communication skills and team dynamics of the competitors. Judges in this category should have some experience with communication and public speaking, as well as some technical engineering experience.

8.2.2.2 DIRECTOR

The competition director is responsible, along with the VC Competitions, for the design and implementation of the Re-engineering competition. The director must present the problem at the beginning of the competition and answer any questions raised by competitors. Only the director may answer questions during the design period. The director will also answer any questions the judges may have during the competition.

8.2.2.3 OFFICIAL TIMEKEEPER

The Official Timekeeper must be responsible for enforcing time limits during the question period, solution development and presentations, as stated in the rules. This role can be run jointly with the director.

8.2.3. EQUIPMENT PROVIDED BY WEC

The following equipment will be made available to all competitors during the design phase:

- Internet connection
- A method to submit the team presentation
- Some information relevant to the design problem, at the discretion of the competition director

The following equipment will be made available to all competitors during the presentation phase:

- One (1) digital projector and screen
- One (1) computer containing the team's presentation file.

- One (1) Podium

8.3. ALLOWED EXTERNAL RESOURCES

The competitors are allowed to bring the following equipment with them:

- Any background research conducted by team members prior to the competition
- Any electronic material stored on CDs, USB keys, disks or other storage devices
- Any textbooks, course notes or other reference materials
- One (1) computer (laptop or tablet) per team member

Note: Since the use of the internet and other external resources is permitted, all information used by competitors must be referenced carefully using the IEEE citation style and a final list of references. Competitors are not permitted to submit work completed by anyone other than the members of their team present at competition.

8.4. PROCEDURE / TIMELINE

8.4.1. PRE-COMPETITION

The first of the competition cases will be distributed via email to competitors one (1) week in advance of the competition.

8.4.2. COMPETITION

8.4.2.1 PROBLEM PRESENTATION

The second of two (2) cases will be presented to the competitors on the first day of competition, prior to the design start time. Teams must develop a solution for this case, in addition to the single case distributed before the competition. The lead time for this distribution will be sufficient to allow for the reading of the case set and to allow for questions to be addressed but should not exceed one (1) hour. Competitors are allowed to use a computer during the lead time to take notes, but internet access will be restricted, and competitors will not be permitted to start working towards a solution during this time.

8.4.2.2 CASE STRUCTURE

The competition will consist of two sets of written cases that will prompt the competitors to apply the re-engineering process and propose a solution. The first case will be sent to the competitors one week in advance of the competition start time. Competitors will be required to propose a solution for the first case, using as much of the advance time as they feel necessary, by the end of the competition design time. The second case set will be distributed at the beginning of the competition design time and its solution will also be required by the end of the competition design time.

8.4.2.3 DESIGN DEVELOPMENT

The competitors will be allowed a maximum of eight (8) hours (Total time at the discretion of the organizers, length to be given to competitors at least seven days in advance) to develop their solution(s) to the cases and prepare their required submission materials.

8.4.2.4 ADDRESSING QUESTIONS

During the design period, competitors will be able to direct questions to the Competition Director by emailing an identified email account. Answers to all collected questions will be emailed to all competitors, along with the questions which they address. For the First Case: every 48 hours. For the 2nd Case (provided at WEC) they will be provided every half hour.

8.4.2.5 CONSULTATION PHONE CALLS AND EMAIL

Competitors are not allowed to place phone calls during the competition time related to the competition cases. Teams will be allowed to utilize email at their own discretion throughout the competition period. However, all original ideas for design and innovation must come from the team members themselves and any communications which contribute significantly to the design must be referenced in the report.

8.4.2.6 DELIVERABLES

The competitors will be required to write a report for each of the cases they complete as well as prepare one presentation to address both cases in front of the judges. Competitors can also opt to combine both solutions into one report of the combined length if they feel this format better conveys their solutions.

8.4.2.7 SUBMISSION

The two written reports and all presentation materials must be submitted immediately at the end of the design time. Submissions can be accepted either through emailing an identified email account or saving the files on a USB drive and physically handing it to the competition director. For the purposes of determining whether a submission was submitted by the deadline: email submissions will be time stamped against the receipt time reported by the receiving email server. Late submissions will not be accepted under any circumstances.

8.4.2.8 DESIGN PRESENTATIONS

Competitors will have a maximum of fifteen (15) minutes to present their solution(s). All team members must be present and participate in the presentation or be penalized by judges. Judges then have a maximum of ten (10) minutes to ask questions. Judges may also ask questions at any time during the presentation. Presentations will be open to the public except for Re-Engineering competition teams who have not yet delivered their own presentation.

8.5. WRITTEN REPORT

8.5.1. CONTENT

Each of the written reports is to include the following information: what the proposed changes are; how the proposed changes meet the requirements laid out in the case description; the technical characteristics of the proposed changes; any calculations which relate to the prior three points.

8.5.2. LENGTH

Each of the reports is not to exceed one side of a single page with a reasonable font size and margin limit; the minimum size for both attributes is 11pt font size and 2 cm margins. The competitors may elect

to shorten one of the reports and use the remaining space for their other report provided both reports are written end-to-end in a single document and the document does not exceed two single-sided pages. The competitors may also elect to write a single report to address both solutions as long it is clear from the structure of the report where each solution is described and the document itself does not exceed two single sided pages.

8.5.3. APPENDIX AND EXHIBITS

Any necessary appendices and exhibits will not count against the above length limitations. Any such included appendices and exhibits however should be clearly referenced in the main text of the report and should not embed an excessive amount of text.

8.5.4. Citation

All competitors are required to cite any outside sources on which the facts and statements in the report are based. Failure to cite all non-original statements will result in a penalty levied against the offending team.

8.6. PRESENTATION

8.6.1. CONTENT

The presentation should cover both completed cases and should present both the material included in the reports and any additional information and explanations required in order to meet the evaluation criteria below.

8.6.2. PROHIBITED CONTENT

In order to ensure that all competitors cease to work on the case solutions once the design time has ended, the competitors cannot include any material in their oral presentation which is not included within their submitted written reports or presentation materials.

8.6.3. EQUIPMENT PROVIDED

The competitors will be provided with the following materials during their presentation: a computer; a projector; PowerPoint software; a whiteboard or a large pad of paper.

8.6.4. PRESENTATION LENGTH

Each team will be allotted 15 minutes for their presentation.

8.6.5. QUESTION PERIOD

Following the presentation, each team will be required to answer questions asked by the judges for a period which will not exceed ten (10) minutes.

8.6.6. DURING THE PRESENTATION

- Time is halted when a judge asks a question during the presentation.

- Time is halted when a team member answers a question asked by a judge.

- The remaining time must be indicated to the competitors ten (10) minutes, five (5) minutes and one (1) minute before the end of the allotted time for the presentation to the judges.

- A countdown presentation that is visible to both the judges and presenters must be given during the last thirty (30) seconds of the presentation.

8.6.7. PRESENTATION ORDER

The presentation order will be selected randomly and will be announced thirty (30) minutes before the first presentation is to take place. All teams must be present for the announcement of the presentation order. Teams will not be allowed to change their own presentation order.

8.7. ASSESSMENT AND JUDGING

- Judges must come from a technical background

- Judging panel will consist of a minimum of three (3) judges in total

- Presentations and assessment may be carried out in the presence of an audience

8.7.1. RE-ENGINEERING JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Re-Engineering

Solution		/60
	Case 1	Case 2
Proposed changes	/15	/10
Technical feasibility	/10	/5
Comercial feasibility	/5	/5
Innovation and creativity	/5	/5
Report		/15
Report organization		/5
Quality of writing		/5
Content		/5
Presentation		/25
Presentation organization		/5
Confidence and presence		/5
Communication		/5
Visual aides		/5
Question responses		/5
Penalties		
Failure to address theme		-10
Insufficient Citation		-50
Absent team member		-25
Plagiarism		DQ

Total		/100

9. SENIOR DESIGN

A team of four students are given a complex engineering problem and are required to design and build a working prototype. The teams will then present their solution and test their prototypes in front of a panel of judges.

9.1. TEAM COMPOSITION

The Senior Design team will comprise between two (2) and four (4) competitors. The entire team must be representing and enrolled in an accredited engineering program at an active WESST member school.

9.2. RESOURCES

9.2.1. FACILITIES REQUIRED

- One (1) Amphitheater (presentation of problem and presentations)
- One (1) workspace for each team (development of prototype and presentation)
- One (1) testing space (testing of prototypes)

9.2.2. PERSONNEL REQUIRED

9.2.3.1 JUDGES

A minimum of three (3) judges are required to assess the problem-solving ability, prototype quality and design skill, and team dynamics of the competitors. Judges in this category should have some technical engineering experience, with experience in mechanical design being an asset.

9.2.3.2 DIRECTOR

The competition director is responsible, along with the VC Competitions, for the design and implementation of the Senior Team Design competition. The director must present the design problem at the beginning of the competition and answer any questions. Only the director may answer questions during the design period. The director will also answer any questions the judges may have during the competition.

9.2.3.3 OFFICIAL TIMEKEEPER

The Official Timekeeper is responsible for enforcing time limits during the solution design period and presentations.

9.2.3.4 VOLUNTEERS

Volunteers will assist the competition director in executing the Senior Design Competition

9.2.4. RESOURCES PROVIDED BY WEC

9.2.4.1 DESIGN PERIOD

The following resources will be made available to all teams during the design phase:

- A workspace with at least one (1) table and four (4) chairs ● A digital storage device for submission of presentation ● Any required competition-specific materials.

9.2.4.2 PRESENTATION PERIOD

The following resources will be made available to all teams during the presentation phase:

- One (1) digital projector and screen
- One (1) computer containing the team's presentation file.
- One (1) Podium
- Testing area

9.2.5. RESOURCES NOT PROVIDED BY WEC

9.2.5.1 REQUIRED RESOURCES

Each team must have one (1) laptop with a working trial copy of the Arduino IDE and the firmware downloader on it. It is recommended that this software is installed a few days before competition.

9.2.5.2 OPTIONAL RESOURCES

Teams may bring the following resources to the competition:

- Three (3) additional laptops (for a total of four (4))
- Textbooks, course notes, or other reference material
- Any additional tools, equipment and/or software as deemed fit by the competition director so long as it is reasonable to expect all participants to have access to said tools, equipment and/or software.

Note: Since the use of the Internet and other external resources is permitted in this competition, all information used by competitors must be referenced very carefully.

Competitors are not permitted to submit work completed by anyone other than the members of their team. If there is any evidence that competitors are submitting plagiarized work, the entire team will be eliminated from the competition and their home schools will be notified. Volunteers will monitor each team during the design process to deter teams from cheating, however, competitors are expected to act in good faith with the spirit of the competition.

9.3. PROCEDURE / TIMELINE

9.3.1. PRE-COMPETITION AND COMPETITION TIMELINE

At least seven (7) days prior to the start of the competition, the main theme(s) dealt with during the competition will be announced to the competitors via their provided email addresses. Moreover, they will receive a list of all required, optional or prohibited equipment, software, and/or tools.

9.3.2. COMPETITION

9.3.2.1 PRESENTATION OF PROBLEM

The problem will be presented to competitors at the beginning of the competition. The competition director will provide detailed explanations of what is expected of competitors, both orally and in writing.

9.3.2.2 QUESTION PERIOD

Upon hearing the problem description, fifteen (15) minutes will be allotted for competitors to ask questions pertaining to the competition. The competition director will do their best to answer these questions. Any questions posed during this period will later be made publicly available, along with their answers, to all competitors.

9.3.2.3 SOLUTION DEVELOPMENT

Teams will be allowed a maximum of eight (8) hours (at the discretion of the organizers, length to be given to competitors at least seven days in advance) to develop their solution, prepare their presentation, and produce all required deliverables, and prepare their presentation for the judges. Teams must submit their deliverables to the competition director any time before the end of the solution development period, or they may be disqualified. Competitors may finish before the end of the allotted time.

9.3.2.4 REST PERIOD

Teams will have at least eight (8) hours of rest in between the end of the Solution Development phase and the beginning of presentations. The presentations will take place the day after the solution development phase.

9.3.2.5 PRESENTATION AND TESTS

The presentation schedule will be posted exactly (30) minutes prior to the first presentation. All teams are required to be present at this time. Competitors have fifteen (15) minutes to present their designs. All team members must be present and participate in the presentation or be penalized by the judges. The original design, its rationale, a description of the design process, and a critique of the prototype must be presented. The judges then have a maximum of fifteen (15) minutes to ask questions. Each team will carry out two tests of their design (or an alternate number of tests specific to the design problem, at the discretion of the competition director). The testing may be carried out at the discretion of the Competition Director.

9.4. TIMEKEEPING

The following rules will be adhered to with respect to timekeeping.

During the problem presentation:

- Time is halted when a judge asks a question during the presentation of the problem.

During the design phase:

- Time is started when all the teams have reached their work areas during development of the solution.

- The remaining time must be announced five (5) hours, one (1) hour, thirty (30) minutes, and ten (10) minutes before the end of the allotted time.

During the presentation and testing phase:

- Time is halted when a judge asks a question during the presentation.
- The remaining time must be indicated to the competitors five (5) minutes and one (1) minute before the end of the allotted time for the presentation to the judges.
- A visual countdown must be given during the last thirty (30) seconds of the presentation to the judges. Presentations may not exceed the allotted time and will be cut-off promptly at the expiration of the visual countdown. Teams who are cut-off will be penalized.

9.4.1. PRESENTATION ORDER

- Presentation order shall be determined randomly.
- Presentation order shall be announced and publicly posted thirty (30) minutes before the presentations to the judges commence. All teams are required to represent themselves at this announcement.
- Teams are not allowed to switch places in the presentation order.

9.5. DELIVERABLES

9.5.1. FOR COMPETITORS

Each competitor will receive, electronically, seven (7) days in advance of the competition, a package outlining the main themes of the competition and any materials and/or tools that will be provided to competitors during the competition. It is the competitor's responsibility to ensure that they have received the package. At the competition briefing, each team will receive a package outlining the problem definition, background information, design and presentation requirements, rules, marking scheme and any other information deemed necessary by the competition director.

9.5.2. FROM COMPETITORS

Each team is required to submit a prototype of their design before the end of the design period. This design will be used to test the team's solution to the design problem. Each team is required to submit, electronically, before the end of the design period, a presentation about their design. The requirements of the presentation will be outlined in the problem design package.

9.6. RESPONSE TO QUESTIONS

- Only the competition director may answer questions during the problem presentation and design phases. Volunteers and judges may not answer questions regarding rules, competition interpretation or procedures at any time.

- During the presentation of the problem, the competition director shall answer orally and write down the answers provided. The questions and answers will be distributed to all teams or posted in plain sight.

- During the design phase, only questions related to deliverable content shall be answered. However, teams will be able to ask for clarifications of the rules which may invalidate a solution they are pursuing. Any and all rule clarifications will be recorded and distributed to all teams or posted in a conspicuous location as soon as they are answered. During the design phase, answers to questions shall be provided in writing

  to all teams at the same time. 15 minutes may be allowed to elapse for a significant number of questions accumulated before responses are provided. A copy of the responses must be provided to the judges prior to the presentations.

9.7. ASSESSMENT AND JUDGING

- Judges must come from a technical background
- Judging panel will consist of a minimum of three (3) judges in total
- Presentations and assessment may be carried out in the presence of an audience
- Feedback forms shall be provided to each team following the announcement of winners but prior to the end of WEC.

9.7.1. SENIOR DESIGN JUDGING MATRIX

A breakdown of the assessment guidelines, and non-comprehensive list of marking criteria is below:

Senior Design

Presentation	/25
Team Strategy	/5
Teams' use of design process	/5
Alternatives considered	/5
Presentation delivery and style	/5
Question responses	/5
Design Quality	**/35**
Abides to the spirit of the comp	/5
Economic, social, and environment impacts considered	/5
Design compliance with expectations	/10
Technical innovation and creativity	/10
Use of resources	/5
Testing	**/40**
Penalties	
Failure to address theme	-10
Insufficient Citation	-50
Absent team member	-25
Plagiarism	DQ
Total	**/100**

9.7.2. FEASIBILITY

Given that the intention of the competition is to create a practicable, realistic solution to the given problem statement, a penalty of fifty (50) points will be deducted from the final score of any team

whose design is based fundamentally upon an impossible concept, and/or makes no realistic attempt to solve the design problem solved within the constraints of the problem statement.