International Natural Sciences Tournament, 2010-2015
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An Approach to the Extramural Round Grading System at VI International Natural Sciences Tournament

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Chapter 1. General Information

I. International Natural Sciences Tournament

The International Natural Sciences Tournament (hereinafter INST) is an annual interdisciplinary students' competition in Chemistry, Physics, Biology, Pharmaceuticals and Engineering. The main goal of the competition is teaching students how to apply their knowledge to solve current practical scientific and industrial problems. The Tournament consists of extramural and intramural rounds, where the teams solve a number of problems (tasks) and present their solutions to experts. The solutions are graded in a specific way which is the subject of the current approach; in particular the Extramural Round Grading System will be discussed.

II. Extramural Round Grading System

The Extramural Round Grading System (hereinafter ERGS) is a specific way for grading the solutions provided by the teams through in the INST extramural round which is followed by selection of teams for the INST intramural round. The ERGS is designed by INST Organizing Committee.

Chapter 2. Extramural Round Grading System's Stages

I. Submission of the Solutions

To be evaluated solutions for all the extramural round problems should be submitted by the teams to the INST Organizing Committee. The solutions are submitted online in personal team attendants' accounts, or send by-email if the online application system is out of order. The solutions have to be in accordance with INST regulations. The solutions provided in wrong formats are not accepted. No paper works are accepted, too.

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II. Grading Parameters

1. Limitations to Number of Experts

The solutions for each of the problems are checked by two separate experts. All the solutions are provided to experts in non-personal form, which means each expert does not know which team's solution he or she evaluates. One expert grades only one of the problems.

2. Experts' Grading Criteria

For each evaluated solution the possible maximum (hereinafter Possible Max) is set to 20 points. Possible Max is spread by the following grading criteria (the scoring range in number of points for each criterion is declared below):

Solution elaboration, scientific approach	From 0 to 4
Solution originality (new and novel ideas, improvement of existing schemes, their presence and quality factor)	From 0 to 2
Literature review (analysis of original sources [books, articles, patents, dissertations, etc.], its completeness and authenticity)	From 0 to 3
Accuracy of task model (compliance to task conditions, indication of solution limitations)	From 0 to 4
Figures, schemes, formulas, reactions	From 0 to 2
Logic and statement consistency	From 0 to 3
List of Sources / References	From 0 to 2

Normally whole numbers are used for the presented grading. To use fractions as grades is acceptable in special cases. Each expert gives the Organizing Committee the grading sheets where criteria evaluations and the total score are presented. Some additional notes for improvement of the solutions could be provided too. The results are published in open access; experts' names are provided to public, too.

3. Normalizing the Experts' Grades

The experts' grades for the checked solutions are then normalized to Possible Max, where NPM is a Normalized to Possible Max score:

$$NPM = \frac{Expert's\ grade}{Possible\ Max} \quad (1)$$

After that the Expert Average for all the graded teams is counted, where n is the total number of evaluated solutions:

$$Expert\ Average = \frac{\sum NPM_i}{n} \quad (2)$$

To reduce each expert's grading deviation, Normalized to Expert Average (hereinafter NEA) for each of the scores is calculated:

$$NEA = \frac{NPM}{Expert\ Average} \quad (3)$$

To get away from the two-expert grading deviation, Task Average for each of the solutions is determined:

$$Task\ Average = \frac{NEA_1 + NEA_2}{2} \quad (4)$$

All the results are published in open access.

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4. Total Score

The Total Score for each team is counted by summing up all the team's task averages. The Total Score is provided in a 3-fraction manner. Total Scores are also published in open access.

Chapter 3. Extramural Round Ranking and Selection Rules

All the teams are put in an extramural round ranking list with their Total Scores and then sorted from best to worst. The following selection rules are used for the teams.

1. Selection on Common Basis

The Organizing Committee provides selection based on the Total Score, the difficulty of the problems and the ability to solve the problems. The list of the selected teams is published immediately after the decision is made. However this rule has two exceptions mentioned below.

2. Selection by Country Representation

This is the first exception. One team from each participating country goes straight to the intramural round, even if the total score is rather low. In case more than one team takes part in the extramural round the higher ranking team passes to the intramural round. The other teams are selected according to the Selection on Common Basis rule.

3. Welcome Rule

This is the second exception. The Organizing Committee cares about spreading the Tournament's borders. That means the team from countries that are participating for the first time goes straight to the intramural round, even if the total score is below the passing grade. If other teams appear later after the results of the first extramural round are announced, they are selected according to the Selection on Common Basis rule.

4. Second Attempt

The teams which didn't pass to the intramural round have an ability to improve their solutions and send them to the Organizing Committee before the mentioned date. In this case the Selection on Common basis Rule is used.

5. Changes and Complains

The dates of the extramural round and the passing grade are subjects to change according to INST Organizing Committee decisions. All the changes are published in open access immediately after such decisions are made. No complaints on grades or dates are acceptable in this order.

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Chapter 4. Status of the Approach

I. Authority, Authorship and Application

The current Approach replaces any previous official documents and other bodies made in the past. The Approach is developed by INST Organizing Committee. Any offers or suggestions could be made to Mr. Sergey V. Safonov, head of INST Organizing Committee, or Mr. Kirill O. Volosnikov, International league coordinator.

II. Effective Date

This Approach takes effect on July 15, 2015.

III. Future Amendments

This approach is adopted and approved by INST Organizing Committee and can be amended or edited only by INST Organizing Committee members. Unless future INST Organizing Committee decisions abrogate this Approach, it remains in force indefinitely.

July 15, 2015