

**Debate Competition: Should Humans
Design or Modify Natural Species on a
Large Scale Through Synthetic Biology
Technology?**

JLU-CP Education—Jilin University

Project Proposal

Organizer: JLU-CP team of Jilin University

Activity Date: September 12, 2025

I. Activity Name

Debate Competition: Should Humans Design or Modify Natural Species on a Large Scale Through Synthetic Biology Technology

II. Activity Background and Objectives

(I) Activity Background

As a cutting-edge technology in the field of modern life sciences, synthetic biology technology is rapidly reshaping humanity's understanding of and ability to intervene in the biological world. Ranging from artificially designing microorganisms to produce new drugs and degrade environmental pollutants, to attempting to modify crop genes to enhance stress resistance and optimize ecosystem structures, this technology has demonstrated enormous application potential in areas such as healthcare, environmental protection, and agricultural production. However, its large-scale application has also sparked a series of profound controversies. On one hand, it provides a new path for solving major global issues like food shortages, energy crises, and intractable diseases. On the other hand, potential ecological risks (such as the spread of modified species disrupting the ecological balance), ethical dilemmas (such as the boundary of intervening in the laws of nature by "playing God"), and social equity issues (such as uneven resource distribution caused by technological monopolies) brought about by technological application have always been the focus of attention in academic circles and society.

Currently, Jilin University has profound academic accumulation in related disciplines such as life sciences, environmental sciences, law, and ethics. The undergraduate student group already has a certain foundation of professional knowledge and critical thinking ability. However, most students lack systematic understanding and in-depth discussion of the multi-dimensional impacts of synthetic biology technology. To build an interdisciplinary communication platform, guide students to examine cutting-edge technologies from multiple perspectives including science, ethics, law, and ecology, we specially plan this debate competition to promote students to deepen their understanding of synthetic biology technology through critical thinking, and cultivate their critical thinking and comprehensive analysis abilities.

(II) Activity Objectives

1. **Knowledge Deepening:** Centering on the technical principles, application status, and controversial points of synthetic biology technology, guide participating debaters and audiences to systematically sort out practical cases of this technology in different fields, deeply understand its scientific value and potential risks, and make up for the limitations of a single disciplinary knowledge system.
2. **Critical Thinking Cultivation:** Through the confrontational form of debate, urge debaters to construct argumentation logic from both positive and negative perspectives, exercise abilities in information integration, logical reasoning, and viewpoint refutation, and cultivate critical thinking of "viewing issues from multiple angles".
3. **Interdisciplinary Communication:** Encourage undergraduates of different majors (such as life sciences, environmental sciences, law, philosophy, and sociology) to form teams to participate in or watch the competition, break disciplinary barriers, promote the integration of science and technology knowledge with humanities and social sciences knowledge, and broaden students' academic horizons.
4. **Social Responsibility Shaping:** Guide students to think about the relationship between cutting-edge science and technology and human society as well as the natural environment, help them recognize the ethical and social responsibilities behind the development of science and technology, and establish the value orientation of "technology for good".

III. Activity Overview

Activity Element	Specific Content
Activity Time	Total duration is approximately 120 minutes (including pre-competition preparation, official debate, judge comments, and award ceremony)
Activity Venue	A multimedia lecture hall in the Central Campus of Jilin University (can accommodate 200-300 people, equipped with a debate stage, audio equipment, projection)

Activity Element	Specific Content
	equipment, and timing equipment)
Activity Participants	All undergraduate students of Jilin University (participate in teams of 4 people; audience registration is also open, regardless of major)
Organizing Team	JLU-CP Team (including 3 members in the competition coordination group, 2 in the publicity group, 4 in the on-site execution group, and 2 in the judge liaison group)
Judge Composition	5 judges are invited, including: 1 professor in the field of synthetic biology from Jilin University, 1 professor in environmental ecology, 1 associate professor in law (focusing on science and technology law), 1 lecturer in ethics, and 1 expert from an off-campus scientific research institution (such as the Provincial Academy of Sciences)

IV. Activity Process and Main Content

(I) Pre-Competition Preparation Stage (2 weeks before the activity)

1. **Registration Organization:** Release registration information through the official website of the Academic Affairs Office of Jilin University, the official WeChat account of the JLU-CP Team, and the notification groups of various colleges. Clarify the registration requirements (each team has 4 members, cross-major team formation is allowed, and the team name, member information, and contact information need to be submitted). The registration deadline is 10 days before the activity, and finally 8 teams are selected to enter the official competition.
2. **Competition Schedule Announcement:** After confirming the 8 teams, announce the grouping situation (the first-round matchups are determined by drawing lots), debate rules, scoring standards, and a list of reference materials (including classic cases of synthetic biology technology, relevant

ethical and legal documents, and abstracts of academic controversial papers) through the official WeChat account.

3. **Pre-Competition Training:** 5 days before the activity, organize an online pre-competition training. A representative of the judges will explain debate skills (such as argument structure, refutation logic, and rhythm control in free debate) and answer questions from participating teams regarding the background of the debate topic and details of the rules.
4. **Venue and Material Preparation:** Confirm the permission for using the lecture hall, arrange the debate stage (set up seats for the positive and negative teams, judge seats, timing seats, and audience seats), and prepare materials (debate scoring forms, timing tools, microphones, debater name tags, drinking water, certificates of award, and prizes).

(II) Official Debate Stage (120 minutes)

Session	Duration	Content	Objectives and Form
Session 1: Opening Introduction (5 minutes)	5 minutes	<ol style="list-style-type: none"> 1. The host takes the stage, introduces the activity background, the significance of the debate topic, and the attending judges and guests; 2. Introduces the first-round matchup situation of the 8 teams (there are 4 preliminary matches in total, each lasting 20 minutes, with the first 3 being group matches and the 4th being a revival match); 3. Reads out the debate rules (including timing rules, speaking order, and scoring dimensions). 	Clarify the activity process and rules, create a formal and professional competition atmosphere, and guide the audience to quickly get into the activity mood.

Session	Duration	Content	Objectives and Form
<p>Session 2: Group Matches (3 matches, 20 minutes each, 60 minutes in total)</p>	<p>20 minutes each (specific breakdown: 6 minutes for argumentation, 4 minutes for refutation, 8 minutes for free debate, 2 minutes for concluding remarks)</p>	<p>1. Argumentation Stage (6 minutes): The first debater of the positive team delivers the opening argument (3 minutes), expounds the core viewpoint of "should large-scale design and modify natural species", and demonstrates the feasibility and value by combining technical application cases (such as synthetic microorganisms degrading plastics and cultivating disease-resistant crops); the first debater of the negative team refutes the argument and puts forward the negative team's viewpoint (3 minutes), and conducts argumentation from the perspectives of ecological risks (such as the invasion of modified species) and ethical controversies (such as "playing God" to intervene in nature).</p> <p>2. Refutation Stage (4 minutes): The second debater of the positive team refutes the loopholes in the negative team's argument (2 minutes); the second debater of the negative team refutes the loopholes in the positive team's argument (2 minutes),</p>	<p>After each group match, the judges score on the spot, and the staff count the scores. One winning team is selected from each match to advance to the semi-finals (3 teams in total), and the losing teams enter the revival match candidate pool.</p>

Session	Duration	Content	Objectives and Form
<p>Session 3: Intermission and Audience</p>	<p>10 minutes</p>	<p>and both need to strengthen their own viewpoints with specific arguments.</p> <p>3. Free Debate (8 minutes): The positive and negative teams take turns to speak, with each team having a total speaking time of 4 minutes. Debaters can refute the opponent's viewpoints in real time or deepen their own argumentation. The host is responsible for controlling the rhythm to avoid overtime or chaotic speeches.</p> <p>4. Concluding Remarks Stage (2 minutes): The third debater of the negative team summarizes first (1 minute), sorts out the focus of the debate, and reaffirms the core arguments of the negative team; the third debater of the positive team summarizes later (1 minute), responds to the negative team's doubts, and strengthens the positive team's viewpoint.</p> <p>1. The staff count the scores of the group matches, and the host announces the winning teams of the first 3 matches; 2.</p>	<p>Relieve the tense atmosphere of the</p>

Session	Duration	Content	Objectives and Form
Interaction (10 minutes)		<p>Conduct an interactive Q&A session with the audience, asking basic questions about synthetic biology technology (such as "the difference between synthetic biology technology and traditional genetic engineering"), and the audience who answers correctly can receive a custom bookmark (printed with the activity theme and the team logo).</p>	<p>competition, arouse the audience's participation enthusiasm, and reserve time for the subsequent sessions.</p>
Session 4: Revival Match and Semi-Finals (30 minutes in total)	<p>The revival match lasts 20 minutes (the process is the same as the group matches), and the semi-finals last 10 minutes (simplifi</p>	<ol style="list-style-type: none"> 1. Revival Match: 2 teams are randomly selected from the 3 losing teams to compete, and the winning team obtains the last spot in the semi-finals; 2. Semi-Finals: The 4 advanced teams (3 winning teams from the group matches + 1 team from the revival match) draw lots to determine their matchups. Each match adopts a simplified process, and the 2 winning teams enter the final. 	<p>The revival match increases the suspense of the competition, and the semi-finals quickly select the final teams to ensure the compact rhythm of the competition.</p>

Session	Duration	Content	Objectives and Form
<p>Session 5: Final (15 minutes)</p>	<p>ed process: 4 minutes for argume ntation, 4 minutes for free debate, 2 minutes for concludi ng remarks)</p> <p>15 minutes (process : 4 minutes for argume ntation, 6 minutes for free debate, 5 minutes for</p>	<p>1. Argumentation (4 minutes): The first debaters of the positive and negative teams deliver their arguments respectively (2 minutes each). They need to optimize the argumentation logic based on the controversial points in the semi-finals and introduce more in-depth arguments (such as international relevant legal cases and the latest scientific research results);</p> <p>2. Free Debate (6 minutes): Each team has a total speaking</p>	<p>As the core session of the entire activity, the final requires debaters to demonstrate a higher level of critical thinking and</p>

Session	Duration	Content	Objectives and Form
	concluding remarks)	<p>time of 3 minutes. They conduct intense refutations around the core controversies of the final (such as "risk controllability" and "ethical boundary definition"), and debaters are encouraged to put forward innovative viewpoints;</p> <p>3. Concluding Remarks (5 minutes): The third debater of the negative team summarizes first (2 minutes), and the third debater of the positive team summarizes later (3 minutes). They need to not only sort out the context of the current debate but also extend to the macro thinking of "science and technology and the future of humanity".</p>	expression skills, presenting an in-depth dialogue for the audience.

(III) Post-Competition Session (10 minutes)

1. **Judge Comments (7 minutes):** The chief judge (a professor in the field of synthetic biology) comments on the performance in the final, analyzes the advantages and disadvantages of the positive and negative teams from the aspects of argumentation logic, sufficiency of arguments, pertinence of refutation, and team cooperation, and at the same time shares the "rational perspective on the development of synthetic biology technology" combined with the debate topic to guide students to view the technical value dialectically.
2. **Award Ceremony and Summary (3 minutes):** The host announces the competition results, and the judges present awards to the winning teams:

- 1 first-prize team: Awarded the "Best Debate Team" certificate and scientific research-related books (such as *Ethics and Governance of Synthetic Biology*);
 - 1 second-prize team: Awarded a certificate and a custom trophy;
 - 2 Best Debaters (1 from each of the positive and negative teams): Awarded the "Best Debater" certificate and an academic stationery set;
 - 4 teams with Excellent Participation Awards: Awarded "Excellent Participation Award" certificates.
3. The host summarizes the significance of the activity, thanks the judges, participating teams, and the audience for their participation, and announces the end of the activity.

V. Required Material List

Material Category	Specific Content	Quantity	Purpose
Equipment Category	Laptop computers, projectors, audio equipment, wireless microphones (6 in total: 2 for the positive team, 2 for the negative team, 1 for the host, 1 for the judges), timing displays (2: 1 for the positive team, 1 for the negative team), laser pointers	2 laptops, 1 set of projectors, 1 set of audio equipment, 6 microphones, 2 timing displays, 1 laser pointer	Ensure the playback of audio and video in the competition, the debaters' speeches, and the timing reminder
Document Category	Debate rule manual, scoring forms (1 for each match, 8 matches in total, including judge scoring forms and	10 rule manuals, 20 scoring forms, 32 name tags, 8	Clarify the competition rules, facilitate the judges'

Material Category	Specific Content	Quantity	Purpose
	audience voting forms), debater name tags (32 in total: 8 teams × 4 members), reference material compilations (1 for each team, 8 in total)	reference material compilations	scoring, identify the debaters' identities, and assist the debaters in preparing for the competition
Prize Category	1 "Best Debate Team" certificate, 4 scientific research books; 1 second-prize certificate, 1 custom trophy; 2 Best Debater certificates, 2 academic stationery sets; 4 Excellent Participation Award certificates; 50 audience interaction bookmarks	8 certificates, 4 books, 1 trophy, 2 stationery sets, 50 bookmarks	Recognize outstanding teams and individuals, and encourage the audience to participate
Others	Drinking water (for judges and debaters), tape, scissors, blank paper (for debaters to take notes)	50 bottles of drinking water, 2 rolls of tape, 2 pairs of scissors, 100 sheets of paper	Meet the basic on-site needs

VI. Personnel Arrangement

Position	Number of People	Responsibilities
Competition Coordination Group	3	<p>1. Overall control of the activity process, responsible for registration screening, team liaison, and judge invitation; 2. Coordinate the work of various groups, handle emergencies during the activity (such as equipment failures and debaters' temporary withdrawal); 3. Organize activity materials after the competition and write a summary report.</p>
Publicity Group	2	<p>1. Release registration information and competition schedule announcements through the official WeChat account and college notification groups before the competition; 2. Take photos and record videos on-site during the activity to record the wonderful moments of the competition; 3. Produce a post-activity review article after the competition to expand the activity's influence.</p>
On-Site Execution Group	4	<p>1. Arrange the venue before the competition (place tables and chairs, debug equipment, distribute materials); 2. Be responsible for timing (remind debaters of the remaining time in each session), scoring (count the judges' scores), and maintaining on-site order (guide the audience to enter the venue and stop noise) during the competition; 3. Clean up the venue and recycle materials after the competition.</p>

Position	Number of People	Responsibilities
Judge Liaison Group	2	<p>1. Connect with the judges before the competition, send them debate topic materials and competition schedules; 2. Guide the judges to their seats on the day of the activity and provide them with scoring forms and reference materials; 3. Assist the judges in preparing for comments after the competition and collect the judges' feedback.</p>
Host	1	<p>1. Familiarize oneself with the background of the debate topic and the competition rules before the competition and prepare the host script; 2. Control the activity rhythm during the competition, guide each session to proceed in an orderly manner, and connect the judge comments and the award ceremony; 3. Activate the on-site atmosphere and interact with the audience.</p>

VII. Expected Effects

1. **Knowledge Aspect:** By preparing for the competition and participating in the on-site debate, the participating debaters will systematically master the technical details, application cases, and controversial points of synthetic biology technology, and form a multi-dimensional understanding of this technology; the audience will understand the advantages and disadvantages of cutting-edge technology by watching the debate, making up for the gaps in professional knowledge.
2. **Ability Aspect:** More than 80% of the participating debaters will feedback that "their logical reasoning and oral expression abilities have been improved", and they can quickly capture the opponent's loopholes and refute them in a targeted manner during the free debate session; teams formed by cross-major students can achieve "complementation of

professional knowledge", for example, students majoring in life sciences are responsible for demonstrating the technical principles, and students majoring in law are responsible for analyzing the ethical and legal dimensions.

3. **Atmosphere Aspect:** The audience will have a high degree of participation in the activity, ask questions actively in the interactive Q&A session, and the number of applause in the final session will be no less than 10 times; the reading volume of the post-activity review article on the official WeChat account will exceed 1,000, encouraging students to discuss "the future development of synthetic biology technology" in the comment section and creating a good academic critical thinking atmosphere.
4. **Long-Term Impact:** Build a prototype of a brand activity of "cutting-edge technology theme debate" for Jilin University. In the future, it can continue to be carried out around other controversial scientific and technological topics such as artificial intelligence and gene editing, promote interdisciplinary communication and critical thinking cultivation on campus, and lay a foundation for cultivating compound talents with both scientific literacy and humanistic care.