

**MOSCOW STATE INSTITUTE OF INTERNATIONAL RELATIONS
MGIMO UNIVERSITY**

School of Government and International Affairs

B.A. in Government and International Affairs

Department of Applied International Political Analysis

«Approved»

Director, School of Government and International Affairs

_____ **M. Troitsky**

«___»_____ 2018

Game-Theoretical Analysis of International Processes

Course Syllabus

The course program developed by Igor Istomin, 2018

Syllabus developed by Igor Istomin, 2018

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The course “Game-Theoretical Analysis of International Processes” is elaborated in accordance with the MGIMO Educational Standard for the Bachelor’s Program in International Affairs (program track “Government and International Affairs”).

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Director of the MGIMO library_____ Marina Reshetnikova

The program is approved by Department of Applied International Political Analysis on

Head of Department_____ Prof. Tatyana Shakleina.

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**PART 1:
INSTRUCTOR INFORMATION, COURSE DESCRIPTION
AND TEACHING METHODS**

1.1 General information

Template

- Full course title: Game-Theoretical Analysis of International Processes
- Type of course: compulsory
- Level of course B.A.
- Year of study: 2nd
- Number of ECTS credits allocated: 2
- Name of lecturer(s) and office hours:
 Dr Igor Istomin, PhD
 Senior Lecturer, Department of Applied International Political Analysis
 Office hours: Friday 5.25 PM- 7.15 PM, office 3036
 E-mail: iaistomin@gmail.com

1.2 Course aims and learning outcomes

The aim(s) of the course is (are) to provide students with foundational knowledge and sound understanding of game theory, to introduce students to its application to the analysis of international politics, to orient students to the diversity of game-theoretical models and multiple tasks they could be used for, to provide students with skills for advancing their knowledge in the field.

Learning outcomes:

By the end of this course students should be able to:

- understand the nature of strategic interactions and corresponding challenges for analysis and decision-making;
- embrace various concepts of utility in their application to politics;
- appreciate the relational nature of power in political interactions;
- distinguish different types of game-models in social environment;
- solve simple (2x2) games in extensive and normal forms in both pure and mixed strategies.

1.3 Course requirements and grading plan

Course requirements

Students will be required to attend not less than 90% of classes and be prepared for class discussions. Conscientious reading of the assigned materials is compulsory. Students will also be required to conduct home assignments and write two in-class tests.

Grading plan

- Class participation - 10%
Students are expected to attend all the lectures seminars and participate in class discussions; since the course is highly interactive, it is essential that students attend the seminars having read the materials for that day's class.
- Written home assignments – 30%
The students are expected to submit written home assignments at least one day before the seminar class. Such papers should include answers to the tasks given at previous lecture.
- In-class tests – 60%
Students will write two tests during the semester. Dates of test classes are defined by the instructor and communicated to the students at the first class of the respective course.
- Written exam – 100% (in class, 90 minutes, for those who failed to achieve satisfactory grade throughout the semester).

PART 2. COURSE CONTENT

2.1 Types of work

Types of work	Academic hours
Total	72
Total for lectures, seminars and written exam	32
Lectures	14
Seminars	18
Written tests and/or exam	4
Homework	40
Written and oral home assignments	20
Preparation for lectures, seminars and written exam	20

2.2. Course content and readings by topic [template]

Topic 1. Foundations of utility and probability theories in assessing preferences

Lecture 1.1 Introduction to the course. Strategic interactions in political relations.

The goal and structure of the course. The attributes of strategic interaction. Examples from social interactions and politics. Private, public and club goods. The logic of collective action and tragedy of commons. The role of supreme authority in domestic politics and international relations. scale. Quantitative and qualitative information and the problem of quantification. Major types of scaling (nominal, ordinal and interval).

Seminar 1.1 Strategic interactions in politics.

- Compulsory readings:
 1. *Hardin G.* The tragedy of the commons // *Science*. – 1968. – No. 162. 1243-1248. <http://cescos.fau.edu/gawliklab/papers/HardinG1968.pdf>
 2. *De Mesquita B.B.* The Predictioneer's Game: Using the logic of brazen self-interest to see and shape the future. N.Y.: Random House Incorporated, 2010. P. 10-29.
- Further readings:
 3. *Olson M.* The logic of collective action; public goods and the theory of groups. Cambridge, Mass., Harvard University Press, 1965.
 4. *Powell R.* The modeling enterprise and security studies // *International Security*. – 1999. – Vol. 24. – No. 2. – P. 97-106.

Lecture 1.2 Rational choice and expected utility.

The concept of rational choice. Limitations of rationalism in politics. Assessing utility in multidimensional comparison. Linear convolution and threshold aggregation. Probability theory and expected utility. Assessing conditional probability.

Seminar 1.2 Assessing utility and expected utility.

- Compulsory readings:
 1. *De Mesquita B. B.* An expected utility theory of international conflict // *American Political Science Review*. – 1980. – Vol. 74. – No. 04. – P. 917-931.
 2. *Kydd A.H.* *International Relations Theory: the Game-Theoretic Approach*. Cambridge: Cambridge University Press, 2015. P. 11-34.

- Further readings:
 1. *Kahler M.* Rationality in International Relations // International Organization. – 1998. – Vol. 52. No. 4. – P. 919-941.

Topic 2. Games in normal form

Lecture 2.1 Zero-sum games.

Antagonistic and non-antagonistic games. Payoff matrix. Iteration dominance. Minimax solution. Saddle point. Zero-sum game model: matching pennies. Solving 2xm games through graphic representation.

Seminar 2.1 Solving zero-sum games in normal form.

- Compulsory readings:
 1. *Brams S.J.* Game theory and politics. Mineola: Dover Publications, 2011. P. 2-17. URL: https://books.google.ru/books?hl=ru&lr=&id=ft0oAwAAQBAJ&oi=fnd&pg=PP1&dq=Game+Theory+and+Politics&ots=4Kx-UBhBTh&sig=olTlwKvozQb7RINGwLOPzI0s9gw&redir_esc=y#v=onepage&q&f=false

Lecture 2.2 Non-antagonistic games.

Dominating and dominated strategies. Major game models: Prisoners' Dilemma, Stag Hunt, Battle of Sexes, Chicken game. Nash Equilibrium in pure strategies. No equilibrium and multiple equilibrium in pure strategies. Thomas Shelling findings on identification of focal points.

Seminar 2.2 Solving zero-sum games in normal form.

- Compulsory readings:
 2. *Kydd A.H.* International Relations Theory: the Game-Theoretic Approach. Cambridge: Cambridge University Press, 2015. P. 36-49.
- Further readings:
 1. *Avenhaus R., Huber R.* A Game-Theoretical Analysis of the Conflict about Iran's Nuclear Program // PIN Points / Processes of International Negotiation Program at the International Institute for Applied Systems Analysis (IIASA) Network Newsletter. – 2007. – № 28. – P.13-15.
 2. *Nash J.* Non-cooperative games // Annals of mathematics. – 1951. – Vol. 54. – Issue 2. – P. 286-295.

Lecture 2.3 Repeated games and games in mixed strategies.

Nash Equilibrium in mixed strategies. The paradox in the Battle of sexes. Solving prisoner's dilemma in repeated games: 'eye to eye' strategy and the role of kindness and forgiveness in optimizing results. Differentiation between Liberal and Realist perspectives on the conditions of Prisoner's Dilemma.

Seminar 2.3 Solving games in mixed strategies.

- Compulsory readings:
 1. *Axelrod R.* Effective Choice in the Prisoner's Dilemma // The Journal of Conflict Resolution. – 1980. – Vol. 24. – No. 1. – P. 3-25.
 2. *Kydd A.H.* International Relations Theory: the Game-Theoretic Approach. Cambridge: Cambridge University Press, 2015. P. 49-53.
- Further readings:
 1. *Powell R.* Absolute and Relative Gains in International Relations Theory // American Political Science Review. – 1991. – Vol. 85. – No. 04. – P. 1303-1320.

Seminar 2.4 Written test.

Topic 3. Games in extensive form

Lecture 3.1 Analyzing bargaining through game theoretical analysis.

Sequential games and construction of game trees. Solving through backward induction. Finding subgame perfect equilibrium. Role of bargaining in preventing conflicts. Ultimatum game.

Seminar 3.1 Solving games on bargaining.

- Compulsory readings:
 1. *Kydd A.H.* International Relations Theory: the Game-Theoretic Approach. Cambridge: Cambridge University Press, 2015. P. 55-73.
- Further readings:
 1. *Fearon J.D.* Rationalist explanations for war //International organization. – 1995. – Vol. 49. – No. 3. P. 379-414.
 2. *Powell R.* Bargaining theory and international conflict // Annual Review of Political Science. – 2002. – Vol. 5. – No. 1. P. 1-30.

Lecture 3.2 Games with nature: bargaining and private information.

Modelling uncertainty. Information sets. The problem of information asymmetry in international politics. Calculation of probabilities in games with nature.

Seminar 3.2 Assessing bargaining with private information.

- Compulsory readings:
 1. *Kydd A.H.* International Relations Theory: the Game-Theoretic Approach. Cambridge: Cambridge University Press, 2015. P. 92-111.
- Further readings:
 1. *Morrow J.D.* Capabilities, uncertainty, and resolve: A limited information model of crisis bargaining //American Journal of Political Science. – 1989. – Vol. 33. -No. 4. P. 941-972.
 2. *Powell R.* Allocating defensive resources with private information about vulnerability // American Political Science Review. – 2007. – Vol. 101. – No. 4. P. 799-809.

Seminar 3.3 Written in-class test.

2.3. Examples of exam tasks

Task 1. Assessing the strategies

Syrian government and rebels are pressed by Russia and the United States to negotiate on the future of their country. Both could negotiate in good faith, imitate interest in negotiations or reject them upfront. Construct a game, assess the values and try to solve it in pure strategies.

Task 2. Finding the Nash equilibrium

Assume that forthcoming negotiations between the UK and the EU could be represented with the following matrix:

	Common market	Restrictions on migration
Soft	m+n-f, x-p-r	m-n-f, x
Tough	m+n, x-p	-n, -x-r

Brussels has two strategies for these negotiations – soft and tough. London has two preferences: to keep the common market with the EU and to restrict migration from the continent. The UK could prioritize either of the preferences. If it chooses the latter option, while the EU pursues soft strategy, then both parties will manage to keep the common market, but if the Brussels employs the tough policy, than parties will not be able to agree on the continuation of British access to it.

Then for the EU:

m – gain, which it has from access of Britain to the common market;

n – gain, which it has from freedom of movement between the EU and Britain;
f – cost of the negative example of softness towards the UL for other reluctant member-states.

For the UK:

x – gain, which it has from the common market with the EU;

p – cost, which the British government will pay for ignoring public opinion opposition towards migration from the EU;

r – cost, which the British government will pay in the public opinion for not being assertive enough or for being too tough if it could get a better deal from Brussels.

In accordance with the recent expert assessment, m is 3 times more than, n, while f is 1/2 of m. Meanwhile, p is 2/5 of x, and r is 1/2 of p. *Find Nash Equilibrium in this game and payoffs for each of the players.*

2.4. Exam timing

Spring semester tests – last week of May.

2.5. Consolidated reading list (in alphabetic order)

1. *Avenhaus R., Huber R.* A Game-Theoretical Analysis of the Conflict about Iran's Nuclear Program // PIN Points / Processes of International Negotiation Program at the International Institute for Applied Systems Analysis (IIASA) Network Newsletter. – 2007. – № 28. – P.13-15.
2. *Axelrod R.* Effective Choice in the Prisoner's Dilemma // *The Journal of Conflict Resolution.* – 1980. – Vol. 24. – No. 1. – P. 3-25.
3. *Brams S.J.* Game theory and politics. Mineola: Dover Publications, 2011.
4. *De Mesquita B. B.* An expected utility theory of international conflict // *American Political Science Review.* – 1980. – Vol. 74. – No. 04. – P. 917-931.
5. *De Mesquita B.B.* The Predictioneer's Game: Using the logic of brazen self-interest to see and shape the future. N.Y.: Random House Incorporated, 2010.
6. *Fearon J.D.* Rationalist explanations for war // *International organization.* – 1995. – Vol. 49. – No. 3. P. 379-414.
7. *Hardin G.* The tragedy of the commons // *Science.* – 1968. – No. 162. 1243-1248. <http://cescos.fau.edu/gawliklab/papers/HardinG1968.pdf>
8. *Kahler M.* Rationality in International Relations // *International Organization.* – 1998. – Vol. 52. No. 4. – P. 919-941.
9. *Kydd A.H.* International Relations Theory: the Game-Theoretic Approach. Cambridge: Cambridge University Press, 2015.
10. *Morrow J.D.* Capabilities, uncertainty, and resolve: A limited information model of crisis bargaining // *American Journal of Political Science.* – 1989. – Vol. 33. -No. 4. P. 941-972.
11. *Nash J.* Non-cooperative games // *Annals of mathematics.* – 1951. – Vol. 54. – Issue 2. – P. 286-295.
12. *Olson M.* The logic of collective action; public goods and the theory of groups. Cambridge, Mass., Harvard University Press, 1965.
13. *Powell R.* Absolute and Relative Gains in International Relations Theory // *American Political Science Review.* – 1991. – Vol. 85. – No. 04. – P. 1303-1320.
14. *Powell R.* Allocating defensive resources with private information about vulnerability // *American Political Science Review.* – 2007. – Vol. 101. – No. 4. P. 799-809.
15. *Powell R.* Bargaining theory and international conflict // *Annual Review of Political Science.* – 2002. – Vol. 5. – No. 1. P. 1-30.
16. *Powell R.* The modeling enterprise and security studies // *International Security.* – 1999. – Vol. 24. – No. 2. – P. 97-106.

PART 3. FINAL REMARKS

Template

- Plagiarism is considered as a severe violation and as an indication of incompetence in the course. Plagiarism is understood as making of one's text using compilation method for other people's publications, even connected with own phrases and sentences. Collective performance of individual tasks is also unacceptable. Proved plagiarism: an F-mark is given regardless of the fulfillment of all other requirements.
- Assignments are to be handed in on the due date. Late submissions will translate into the lowering of the grade by 5 points (out of 100) for each day of delay.
- Students are asked to keep a copy of all work submitted for evaluation.