



UNIVERSITY OF PLOVDIV
“PAISII HILENDARSKI”

**Faculty of Economic and
Social Sciences**



Centre of Technologies



STUDENT GUIDE / SYLLABUS

Academic Course

BIOECONOMY AND HEALTH POLICIES

For Students of the Master Programs

Of the Faculty of Economic and Social Sciences
Of the University of Plovdiv “Paisii Hilendarski”

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I. ACKNOWLEDGMENTS

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I highly appreciate the positive attitude of Professor Iliev to work with me towards integration of Economic and Social Sciences with the Biological sciences, and Life Sciences in general into setting one new academic standard in studying Bioeconomy through this Student Guide / Syllabus, titled “**Bioeconomy and Health Policies**”. To my humble knowledge, this Syllabus is the first of its kind in the Bulgarian scientific communities and academics.

I am much thankful to my relatives and friends, who actively helped me and encouraged me to put together the pieces of knowledge I have into one transdisciplinary academic course, composing this Syllabus.

I believe that the selected topics shall be interesting not only to the students and men of academies, but also to the people in their daily routines and talks, as well as to the men of business. Thus, I am especially grateful to the many representatives of private business at the City of Plovdiv, which supported the idea, that not only students, but also both public and private sector stakeholders would greatly benefit from one systematized approach to study Bioeconomy. I sincerely believe that this academic course will mark the beginning of many constructive public initiatives, professional discussions and real projects in the field of “**Bioeconomy and Health Policies**”.

II. EXECUTIVE SUMMARY

Bioeconomy is a new not only interdisciplinary, but also transdisciplinary field of sciences, based mainly on two traditional university disciplines: Biology (Life Sciences) and Economics (Human and Social Sciences). Thus, Bioeconomy is to investigate both theoretically and practically interaction, exploitation and mutual influences of different dynamic systems: the dynamics of the organismic world of living nature and the dynamics of economic ecosystems.

Theoretically, Bioeconomy is deemed to explore the main fields of the biological cycle for creation, growth and death of living organisms, which coincide with the three main phases of consumer and industrial behavior: extraction of raw materials and production of finished products, consumption of finished products, and waste disposal. This necessitates a special class of academic study and knowledge of trends and directions for finding a “Common Solution” in all areas of biological science, human health, and the new economic architecture and organization of markets.

From an applied point of view, Bioeconomy is new for the country, but it is increasingly recognized as a “Circular Economy” or a “Regenerative Economy”, which relies on the formulation of the use of all elements and materials in a constant cycle without residues. This field of application sheds new light on the meaning of human health as an individual, but also as a collective good.

In order to provide an adequate response to the new challenges of modernity and the cascading entry of a new generation of epidemiological crises, the academic considerations on Bioeconomy should involve the perspectives for human health and implementation of adequate health policies of new generation.

In this sense, a completely new, genuine, and up-to-date academic course in “*Bioeconomy and Health Policies*” is offered in the Master’s Program in “*Health Economics and Policies*” at the Faculty of Economics and Social Sciences of the University of Plovdiv “Paisii Hilendarski”, City of Plovdiv.

The course in “*Bioeconomy and Health Policies*” is offered as an academic standard of higher education in the new field of Bioeconomy, in line with the most recent and up-to-date issues of transition from the clas-

sical economic paradigm to the bioeconomic one. The emphasis of the course is set onto in-depth considerations towards the challenges to human health and the need to introduce a new generation of health policies.

The scientific and economic apparatus and practical cases from various economic industries are designed as an academic vehicle to connect the business challenges to current issues of building sustainable health policies, related to the new apprehension of natural capital and environmental protection.

Economic resources are viewed through the prism of “economic capital”, and natural resources are called “natural capital”, because the term “capital” has a new economic meaning in terms of renewables, recyclings, added economic values and waste recovery through a new generation of industrial paradigms and technologies that spare and protect human health.

The educational logic in the course **“Bioeconomy and Health Policies”** is organized in a cycle of upgrading modules one after another; there are 10 academic modules of 3 academic hours each in this course.

The first Module № 1 introduces the basic concepts and definitions, while the final Module № 10 establishes the academic links between the topic of Biosecurity and the entry and promotion of Personalized Medicine, which is forthcoming for Bulgaria.

Modules № 2, № 3 and № 4 – outline in theoretical terms the scientific fields, concerning the connection of economic capitals and natural capitals to the new bioeconomic paradigm that is entering modern societies.

In applied terms, Bioeconomy is discussed in a comparative way to the three traditional models of economic organization of industries: economies based on industrial inorganic chemistry – Module № 5; economies based on industrial organic chemistry – Module № 6; and economies based on industrial polymer chemistry – Module № 7.

Module № 8 illustrates the emergence of an economy based on biochemistry and biotechnology – the foundations of the emerging new concept of Bioeconomy, as an industrial organization of the market economy.

Module № 9 outlines the new avantgarde theoretical and applied field of commissioning of smart technologies and bioprocessor technologies in industrial production and / or products containing technological elements and processes of top generation.

In these five modules: № 5, № 6, № 7, № 8 and № 9 are presented the corresponding challenges for organizing the new generation of health policies.

“Modern diseases” such as diabetes, asthma, allergies, cancer diseases and others – apart from the purely medical etiology – are also a complex of consequence of numerous factors. For example, such factors, which contribute to widespread of modern diseases are personal wrong choices and decisions about the way of life, way of eating, way of working, use of cosmetic products of controversial quality, use of detergents with unclear formulas for the end-user, use of synthetic fabrics dyed with toxic dyes, carcinogenic packaging and many other factors.

From the point of view of the complexity and integrity of the academic course in “*Bioeconomy and Health Policies*”, the main consideration is to set a new standard for economic thinking, which will go through the personalized approach to human health, but oriented towards new relevant industrial, environmental, and health policies in modern societies.

III. LANGUAGE OF INSTRUCTIONS

Languages of instruction and communication with the Lecturer in this Academic Course are two: Bulgarian and English.

IV. COURSE PREREQUISITES

The course is organized as an integral transdisciplinary course – based on utilization of different academic disciplines related to Earth Sciences, Life Sciences, Environmental Sciences, Medical, Economic and Social Sciences.

In this sense, general and specialized knowledge of Biology, Chemistry, Geography, Limnology, Dendrology, Edaphology and others will benefit the course learners.

In practice, students are expected to accrue a relatively broader general culture and sense of curiosity – on the one hand – into natural sciences in the broadest sense of the word about the functioning of living and non-living nature, flora and fauna, and on the other hand – into economics and economic behavior of different market participants, entrepreneurship and social behavioral norms and attitudes toward the world around them.

V. MODES OF INSTRUCTIONS

The course is organized in 30 teaching hours.

In teaching the course “*Bioeconomy and Health Policies*” the following methods of instruction are utilized:

- lectures: on specific integrated and transdisciplinary theoretical and methodological topics;
- studying of cases: practical comprehension of new, specific and discussion concepts;
- internet-based applied research work – related to analyze pieces of knowledge in individual and / or group practical assignments;

Priority is given to interactive learning, using the case method and independent work in Internet. Students are encouraged to write projects on a case, to develop independent analyzes in the field of bioeconomy and health policies, as well as to participate in group theoretical and applied discussions and workshops during the semester.

VI. COURSE TEACHING POLICIES

- The presence and active participation of students during the course is strongly encouraged;
- The use of modern computer and information equipment and technologies in time of the educational process by students is strongly encouraged, as well;
- Communication with the lecturer electronically is encouraged;
- High level of academic and creative atmosphere is maintained during the course;
- Discrimination on the basis of ethnicity, sex, age, race, religious beliefs is not tolerated in any way during the course;

VII. EXPECTED RESULTS

The students, who successfully complete the course in “*Bioeconomy and Health Policies*” are expected:

1. To know:

- The principles of functioning of the classical industrial schemes for adding economic value in the XIX and XX centuries, as well as the mechanisms of the emerging bioeconomic paradigm, emerging on the threshold of the XXI century;
- The main theoretical perspectives and applied fields of production processes in terms of industrial synthetic chemistry and the organization of economic interaction between market participants, based on processes and products of biochemistry and biotechnology, environmentally friendly and natural dynamics of different populations – plant, animal and human – with a focus on human health;
- The traditional classical economic segments of the economy, based on productions, processes and products – related to inorganic chemistry, organic chemistry, polymer chemistry, biochemistry and new economic fields – the development of smart technologies – and in particular: bioprocessor technologies and nanotechnologies;
- The economic ties and relations of Bioeconomy – tuned to comfort bio-based industries, directly related to the new generation of health policies on a global, European and national scales;

2. To be able:

- To orient themselves in the new, specialized and discussion terms of the entering bioeconomic paradigm;
- To recognize the economic issues and the possible economic externalities with references to human health with a view to the preparation of specialized integrated analyses;
- To indicate the direct and indirect advantages and disadvantages of preparation of initiatives, proposals and projects for the implementation of bio-based productions;
- To develop thinking skills from the standpoint of public, institutional, corporate and personal interests on the new axis: economic capital – human capital – natural capital, in the context of the circular economy;
- To classify and process different types of expert information and data in the field of Economic Sciences and Life Sciences;
- To read and prepare specialized economic reports on various topics in the field of bioeconomy and health policies;

VIII. LECTURE PLAN

The Lecture Plan is organized on a modular basis in 10 Modules, each consisting of 3 academic hours on standardized teaching materials, lectures and professional expertise of Assoc. Prof. Atanas Vladikov, PhD.

Academic Module №	Topics	Academic Load (in hours)
<p>Module-1</p> <p>Introduction to the Course and Introductory Lecture</p>	<p>Introduction to the academic course <i>“Bioeconomy and Health Policies”</i> and presentation of the organization of work in the course. Delivering instructions on the due Capstone Project of the course as a mandatory element of the Curriculum.</p> <ol style="list-style-type: none"> 1. Introduction to the Course “Bioeconomy and Health Policies”: Reasons to Emerge, Core Concepts, Research Approaches and Basic Theoretical Paradigms and Models, related to the Classical Economic Paradigm and Bioeconomy; Scope of Definitions – “Circle economy” / “Bioeconomy”. 2. Bioeconomy as Science. Subject, Scope, Goals, Tasks. 3. Significance and Development of Transintegral Thinking: Biology – Economy – Health Policies; Evolvement of Bioeconomy and its Links to Human Health to form Health Policies. 4. The New Thinking Axis: Economic Capital – Human Capital – Nature Capital; Challenges and New Professional Practices of Work in Conditions of the Bioeconomy Paradigm. 5. New Ethical Considerations and Practices, related to Ecological Indicators and Bioeconomy Paradigm, and to Personal and Public Health, as well as to the New Generation of Health Policies. <p>Introduction to the Course § Introductory Lecture</p>	<p>3</p>

<p><i>Module-2</i></p> <p>Fossil Fuels and Bioeconomy</p>	<ol style="list-style-type: none"> 1. The Resource “Fossil Fuels”, Oil Refinery, Oil Products, and Industrial Relations in the Classic Economic Scheme. 2. Biorefinery, Biofuels, and Bio-based Industries in the Bioeconomy Scheme. 3. Force-major Conditions and Anthropogenic Factor in Bioeconomy: Global Pollution of Environment, Fires, Floods, Explosions, Other Natural Disasters, and Emergencies. 4. Problems and Consequences for Human Health, accounting Air Pollution, Waste Waters Pollution and Pollution of Soils in organizing the Classical Economic Paradigm, based on Petroleum-Chemical Industry, Oil-based Productions, and Synthetic Chemistry for reaching Industrial Goals. 5. Economic Externalities of the Classical Economic Paradigm and Modes of overcoming them through Introduction of the Principles of Circle Economy. <p>Lecture and Group Discussion</p>	<p>3</p>
<p><i>Module-3</i></p> <p>Economic Capital and Bioeconomy</p>	<ol style="list-style-type: none"> 1. Blue Economy. Green Economy and the “Emerging Markets” based on Bioeconomy 2. Global Model for Bioeconomy 3. Bioeconomy in EU. The “Green Deal” of the EU 4. Bioeconomy in Bulgaria 5. Prerequisites to transit from Conservative Health Policies to Health Policies of New Generation in the Conditions of Bioeconomy <p>Lecture and Group Discussion</p>	<p>3</p>
<p><i>Module-4</i></p> <p>Nature Capital and Bioeconomy</p>	<ol style="list-style-type: none"> 1. Earth Sciences: Research Results on Lithosphere, Atmosphere, Hydrosphere, and Biosphere; Bioeconomy, Environment, and Waste-Free Technologies. 2. Sciences related to Plant World and Animal World and Bioeconomy: Botany, Zoology, Ecology, and Evolutionary Biology. Problems of Industrial Hunting and Fishing 3. Nature Capital and Bioeconomy: Use of Plant Material; Wood and Agroindustry Waste; Classic and Bioeconomy Paradigm to utilize Plant Waste. 4. Sciences related to Water, Water Capital and Bioeconomy. 5. Bioeconomy and “New Comprehension” of Life Sciences – Biochemistry, Biophysics, Molecular Biology; Avant-garde Fields in Human Medicine – Immunology, Toxicology, Virology, Pharmacology. <p>Lecture</p>	<p>3</p>

<p>Module-5</p> <p>Economy based on Industrial Inorganic Chemistry and Bioeconomy</p>	<ol style="list-style-type: none"> 1. Synthetic Products of Nitrogen. Ammonia. 2. Agrochemical Industry; Fertilizers – Nitrogen and Nitrogen-Phosphorus Fertilizers. 3. Nitrogen-based Animal Feed. 4. Commercially-oriented Explosive Products 5. Health Policies in Production, Processes, and Consumption – based on Inorganic Chemistry Industry <p>Lecture</p>	<p>3</p>
<p>Module-6</p> <p>Economy based on Industrial Organic Chemistry and Bioeconomy</p>	<ol style="list-style-type: none"> 1. Food Industry. Animal and Vegetable Fats. Carbohydrates. 2. Cosmetics and Perfumery Industry Laziness. Soaps, Fatty Acids and Synthetic Detergents. 3. Pharmaceutical Industry: from Pharmaceutical to Biopharmaceutical Technologies. 4. Household Chemicals: Detergents, Paints, Their Application and Replacement with Non-Toxic Organic Products 5. Health Policies in Production, Processes, and Consumption – based on Organic Chemistry Industry <p>Lecture and Group Discussion</p>	<p>3</p>
<p>Module-7</p> <p>Economy based on Polymer Chemistry and Bioeconomy</p>	<ol style="list-style-type: none"> 1. Textile Industry. Natural Fibers: Cotton, Wool, Silk. Biotextile and Synthetic Polymers: Nylon, Polyester, Acrylic Productions, Vinyl, Others; Their Application as Medical Products. 2. Manufacture of Glass and Products of Glass. 3. Commercial Plastics, Biopolymers and Medical Polymers. 4. Production of Synthetic Tires and Biodegradable Tires 5. Health Policies in Production, Processes, and Consumption – based on Polymer Chemistry Industry <p>Lecture and Group Discussion</p>	<p>3</p>
<p>Module-8</p> <p>Economy based on Biochemistry and Biotechnologies</p>	<ol style="list-style-type: none"> 1. Classical Biotechnology. Microbial Biotechnologies. Commercial End-Products of Fermentation. 2. New Commercial Products, designed as a Result of Cellular and Genetic Engineering. 3. Agrobioindustry. Biofertilizers. 4. Overcoming Protein Starvation in a Global Scale. Proteins and Peptides – Separation and Formulation 5. Health Policies in Production, Processes, and Consumption – based on Biochemical and Biotechnological Technologies <p>Lecture</p>	<p>3</p>

Module-9 Nanotechnologies and Bioeconomy	1. Smart Technologies 2. Bioprocessing Technologies 3. Nanotechnologies 4. Ecological Renewable Energy Sources 5. Health Policies in Production, Processes, and Consumption – based on Smart Technologies Lecture	3
Module-10 Biosecurity and Bioeconomy	1. Biosecurity and Defense against Bioterrorism. 2. Biosecurity and Cybersecurity. 3. Biosecurity and Personal Data Protection. 4. Biosecurity, “New Diseases” (Diabetes, Asthma, Allergies, Cancer), and Personalized Medicine. 5. Environmental Protection Policies and Natural Harmony between Man and Nature, and the Conversation on Human Health. Lecture and Group Discussion	3
Total		30 hours

IX. SOURCES OF INFORMATION

Note: the corpus of information sources – academic, institutional, analytical, popular, and others (in Bulgarian and foreign languages) is organized on the basis of the chronological relevance of the publications and by sections.

9.1. IN ENGLISH LANGUAGE

9.1.1. Core Academic Literature

1. Filho W., at all, 2018, *Towards a Sustainable Bioeconomy: Principles, Challenges, and Perspectives*, Textbook, Springer, Berlin
2. Folland S., at all, 2017, *The Economics of Health and Health Care*, 8th Ed., International Edition, Textbook, London, New York, Routledge
3. Mitra J., 2016, *The New Health Bioeconomy. R&D Policy and Innovation for the Twenty-First Century*, Textbook, Palgrave Macmillan
4. Schieb P-A, at all, 2015, *Biorefinery 2030: Future Prospects for the Bioeconomy*, Springer, Berlin
5. Young P., at all, 2010, *Value in Health Care. Accounting for Cost, Quality, Safety, Outcomes, and Innovation*, Textbook, Institute of Medicine of the National Academies, The National Academies Press, Washington DC

6. Bhatia R., R. Ichhpujani, 2008, *Essentials of Medical Microbiology*, 4th Ed., Textbook, Jaypee Brothers Medical Publishers, India
7. Cooper J., M. Cooper, 2007, *Introduction to Veterinary and Comparative Forensic Medicine*, Textbook, Blackwell Publishing
8. Raghunath H., 2006, *Hydrology. Principles, Analysis, Design*, Textbook, New Age International Publishers, India
9. Voet D., J. Voet, 2004, *Biochemistry*, 3rd Ed., Textbook, Wiley International Edition
10. Brown T., H. Eugene LeMay Jr., Br. Bursten, 2000, *Chemistry. The Central Science*, 8th Edition, Textbook, Prentice Hall
11. Carlson G., D. Zilberman, J. Miranowski, 1993, *Agricultural and Environmental Resource Economics*, Textbook, Oxford University Press
12. Rehm H., G. Reed – Editors, 1993, *Biotechnology. Bioprocessing*, 2nd Ed., Vol. 3, VCH
13. Winston P., 1992, *Artificial Intelligence*, 3rd Ed., Textbook, Reading Massachusetts, Addison-Wesley
14. Kuhn T., 1970, *The Structure of Scientific Revolutions*, 2nd Ed. (enlarged), Textbook, University of Chicago Press

9.1.2. Advanced Academic Literature

1. Jun Su, Ikuko Kato, 2016, *Gut Microbiota, Inflammation and Colorectal Cancer, Genes and Diseases*, Issue 3, pp. 130-143, Science Direct, Elsevier
2. Ivanova M., 2014, *Assessing the Outcomes of Rio+ 20. In: State of the World 2014: Governing for Sustainability*, Island Press, World-watch Institute, Washington DC
3. Iliev I., at all, 2013, *Food or Medicine. Future of Lactic Acid Bacteria*, Sofia University
4. Harcourt A., 2012, *Human Biogeography*, Berkeley, University of California Press
5. Birch K., D. Tyfield, 2012, *Theorizing the Bioeconomy: Biovalue, Biocapital, Bioeconomies or ... What?*, Science, Technology and Human Values 38(3): 299–327
6. Ladle R., R. J. Whittaker, 2011, *Conservation Biogeography*, Wiley-Blackwell
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8. Cambrosio A., P. Keating, A. Mogoutov, 2004, *Mapping Collaborative Work and Innovation in Biomedicine*, *Socia Studies of Science* 34(3): 325–364.
9. Fet, Victor, Popov Al. (Eds.), 2007, *Biogeography and Ecology of Bulgaria*, Springer, Netherlands
10. Ishikawa M., G. Huppess, 2007, *Quantified Eco-efficiency. An Introduction with Applications*, Springer
11. Ferrara J., 2007, *Personalized Medicine: Challenging Pharmaceutical and Diagnostic Company Business Models*, *McGill Journal of Medicine* 10: 59–61.
12. Dimitrov R, 2006, *Hostage to Norms: States, Institutions and Global Forest Politics*, MIT Press
13. Bock Anne-Katrin, E. Rodriguez-Cerezo, 2005, *Human Tissue-Engineered Products: Potential Socio-Economic Impacts of a New European Regulatory Framework for Authorisation, Supervision and Vigilance*, European Commission, Joint Research Centre
14. Muller K., A. Strum, 2001, *Standardized Eco-efficiency Indicators*, Ellipson
15. Carle J, P. Vuorinen, A. Del Lungo, 2001, *Status and Trends in Global Forest Plantation Development*, FAO, Rome, Italy

9.1.3. Books

1. Rockstrom J. at all, 2017, *A Roadmap for Rapid Decarbonization*, Science 355
2. Fioramonti L, 2017, *The World after GDP*, Polity Books, Cambridge, UK
3. Jamaldeen M., 2016, *The Hidden Billions*, Melbourne, Oxfam
4. Westhoek H., at all, 2016, *Food Systems and Natural Resources*, UNEP
5. Maxton G., J. Harter, 2016, *Reinventing Prosperity*, Greystone Books, Vancouver/Berkeley
6. Fullerton J., 2015, *Regenerative Capitalism*, Capital Institute
7. Gilding P., 2015, *Fossil Fuels are Finished – the Rest is Just Detail*, Renew Economy, Clean Energy News and Analysis
8. Creutzig F., 2015, *Evolving Narratives of Low-Carbon Futures in Transportation*, *Transp. Rev* 36 (3): 341-360
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10. Constanza R., at all, 2014a, *Time to Leave the GDP Behind*, Nature 505 (7483): 283-285
11. Abate T., 2013, *The Biotech Investor: How to Profit from the Coming Boom in Biotechnology*, Times Books
12. Lovins A., 2011, *Reinventing Fire. Bold Business Solutions for the New Energy Era*, Rocky Mountain Institute
13. Pauli G., 2010, *The Blue Economy. 10 Years, 100 Innovations, 100 Million Jobs*, Paradigm Publishers
14. Eisler R., 2008, *The Real Wealth of Nations. Creating a Caring Economics*, Berrett-Koehler Publishers
15. Hawken P., A. Lovins, H. Lovins, 1999, *Natural Capitalism: Creating the Next Industrial Revolution*, Little, Brown Co, New York
16. Constanza R., at all, 1997, *The Value of the World's Ecosystem Services and Natural Capital*, Nature 387 (6630): 253-260
17. Bodecker G., at all, 1997, *Non-Wood Forest Products. Medicinal Plants for Forest Conservation and Health Care*, UN FAO

9.1.4. Other Sources: International Analyses and Institutional Publications

1. Report, 2020, *Global Polymers Market, By Type, By Product, By Application, By Region, Competition, Forecast & Opportunities, 2025*, Research and Markets
2. Report, 2019, *Emissions Gap Report*, United Nations Environment Program
3. Report, 2019, *The Added Value of a Food Systems Approach in Research and Innovation*, Policy Brief by Standing Committee on Agricultural Research (SCAR) Strategic Working Group on Food Systems, European Commission
4. Report, 2019, *Guide to the Business of Chemistry*, American Chemistry Council
5. Report, 2018, *Innovation in the Global Bioeconomy for Sustainable and Inclusive Transformation and Wellbeing*, Global Bioeconomy Summit, Conference Report, Federal Ministry of Education and Research, Germany
6. Report, 2018, *Achieving Blue Growth. Building Vibrant Fisheries and Aquaculture Communities*, Food and Agricultural Organization of the United Nations

7. Report, 2018, *Impacts of Climate Change on Fisheries and Aquaculture*, Food and Agricultural Organization of the United Nations
8. Report, 2018, *Elements of the Chemistry Business*, American Chemistry Council
9. Report, 2016, *The Crude Breakdown for Exploration and Production Companies*, Deloitte Center for Energy Solutions
10. Report, 2016, *Futures of Food Provision*, Price Waterhouse Coopers (PWC)
11. Report, 2016, *How Sustainability is Addressed in Official Bioeconomy Strategies at International, National, and Regional Levels. An Overview*, Food and Agricultural Organization of the United Nations
12. Report, 2016, *Global Chemicals Outlook. Towards Sound Management of Chemicals*, United Nations Environment Program (UNEP)
13. Report, 2015, *The State of Food Insecurity in the World. Meeting the 2015 International Hunger Targets: Taking Stock of Uneven Progress*, Rome, FAO, IFAD, WFP
14. Report, 2015, *The Circular Economy and Benefits for Society. Swedish Case Study shows Jobs and Climate as Clear Winners*, Club of Rome, Winterthur
15. Report, 2015, *The “Push-Pull” Farming System: Climate-Smart, Sustainable Agriculture for Africa*, The International Centre of Insect Physiology and Ecology
16. Report, 2014. *Assessing Global Land Use: Balancing Consumption with Sustainable Supply*, UNEP and International Resource Panel
17. Report, 2014, *Global Policy Action Plan. Incentives for a Sustainable Future*, World Future Council Foundation, Oeding Print, Braunschweig
18. Report, 2014, *System of Environmental-Economic Accounting: 2012. Central Framework*, UN, EU, at all
19. Report, 2013, *Towards the Circular Economy. Opportunities for Consumer Goods Sector*, McKinsey
20. Report, 2013, *Global Land Transport and Infrastructure Requirements*, International Energy Agency
21. Report, 2013, *World Social Science Report: 2013. Changing Global Environments*, Paris, OECD Publishing, UNESCO Publishing
22. Report, 2013, *Big Data Roadmap*, London, Association of the British Pharmaceutical Industry (ABPI)

23. Report, 2012, *Paving the Way for Personalized Medicine: FDA's Role in a New Era of Product Development*, US Department of Health and Human Services, FDA Report
24. Report, 2012, *One Planet. How many People? A Review of Earth's Carrying Capacity*, UNEP Global Environmental Alert Service
25. Report, 2005, *Biomass as Feedstock for a Bioenergy and Bio-Products Industry: Technical Feasibility of a Billion-Ton Annual Supply*, US Department of Energy, US Department of Agriculture
26. Report, 2009, *Solving the Climate Dilemma: the Budget Approach*, WBGU, Berlin
27. Report, 2009, *Eco-efficiency Indicators: Measuring Resource-use Efficiency and the Impact of Economic Activities on the Environment*, UN ESCAP
28. Report, Undated, *Opportunities and Risks of Nanotechnologies*, Editor: Dr. Christoph Lauterwasser, Allianz Center for Technology, in co-operation with the OECD International Futures Program

9.1.5. Recent Documents of EU Institutions in Reference to Bioeconomy Communications

1. COM (2020) 80 Final, *Proposal for a Regulation of the European Parliament and of the Council establishing the Framework for achieving Climate Neutrality and amending Regulation (EU) 2018/1999 (European Climate Law)*, Communication from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (EESCCR)
2. COM (2020) 95 Final, *Commission Staff Working Document Evaluation of the Regulation (EC), No 1924/2006 on Nutrition and Health Claims made on Foods with regard to Nutrient Profiles and Health Claims made on Plants and Their Preparations and of the General Regulatory Framework for their Use in Foods*, Communication from the European Commission to the European Parliament, the Council, the EESCCR
3. COM (2020) 380 Final, *EU Biodiversity Strategy for 2030. Bringing Nature Back into Our Lives*, Communication from the European Commission to the European Parliament, the Council, the EESCCR
4. COM (2019) 640 Final, *The European Green Deal*, Communication from the European Commission to the European Parliament, the Council, the EESCCR

5. COM (2017) 479, *Investing in a Smart, Innovative and Sustainable Industry. A Renewed EU Industrial Policy Strategy*, Communication from the European Commission to the European Parliament, the Council, the EESCCR
6. COM (2016) 860, *Clean Energy for All Europeans – unlocking Europe’s Growth Potential*, Communication from the European Commission to the European Parliament, the Council, the EESCCR
7. COM (2015) 614, *Closing the Loop – an EU Action Plan for the Circular Economy*, Communication from the European Commission to the European Parliament, the Council, the EESCCR

Strategies

1. Strategy, 2020, *Farm to Fork Strategy, For a Fair, Healthy, and Environmentally-Friendly Food System*, European Union
2. Strategy, 2018, *A Sustainable Bioeconomy for Europe: Strengthening the Connection between Economy, Society, and the Environment*, European Commission, Updated Bioeconomy Strategy
3. Strategy, 2018, *A European Strategy for Plastics in a Circular Economy*, Communication from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions

Plans, Researches, and Reports

1. Plan, 2020, *BLUEMED Preliminary Implementation Plan*, Horizon 2020, Group of Senior Officials BlueMed Working Group
2. Report, 2019, *Synthesis of Existing Food Systems Studies and Research Projects in Europe*, European Commission
3. Report, 2019, *Discovering Algae’s Power as a Renewable Resource*, CORDIS Results Pack on Algae, A thematic collection of innovative EU-funded research results, Directorate-General for Research and Innovation, European Commission
4. Report, 2019, *Ocean Plastics. Sustainable and Innovative Solutions to Tackle the Plastics Crisis in our Oceans and Seas*, Directorate-General for Research and Innovation, European Commission
5. Plan, 2018, *Bioeconomy: The European Way to Use Our Natural Resources, Action Plan*, Directorate-General for Research and Innovation, European Commission

6. Report, 2018, *Sustainable & Circular Bioeconomy, the European Way*, Directorate-General for Research and Innovation, European Commission
7. Study, 2018, *Top 20 Innovative Bio-Based Products, Task 3 of Study on Support to R&I Policy in the Area of Bio-Based Products and Services*, University of Bologna, Fraunhofer ISI
8. Report, 2017, *Sustainable Blue Economy. Productive Seas and Oceans*, Directorate-General for Research and Innovation, European Commission

9.2. IN BULGARIAN LANGUAGE

Note: Publications in the following sections are translated into English for convenience of the foreign reader.

9.2.1. Core Academic Literature

1. Assenov A., 2019, *Biogeography*, Textbook, Sofia, University Library № 521, “St. Kliment Ohridski” Sofia University Press
2. Primak R., J. Uzunov, B. Georgiev, 2018, *Conservation Biology*, Textbook for Higher Schools, Sofia, Publisher “Pensoft”
3. Zhelyazkova V., 2017, *Circular Economy. Financial Aspects*, Textbook, Sofia, University Publisher “St. Gregory the Theologian”
4. Plochev K., 2012, *Bioterrorism. The Hidden War*, Sofia, Publisher “Zachary Stoyanov”

9.2.2. Advanced Academic Literature

1. Yosifov T., 2020, *High-Tech Innovations through Equity Participation*, Plovdiv, Publisher “Macros”
2. Iliev I., T. Vasileva, 2014, *Enzymology*, Plovdiv University Press
3. Iliev I., P. Bozov, T. Vasileva, 2013, *Manual of Biochemistry*, Plovdiv University Press
4. Sarafov T., 2010, *New Interpretation of the Soil Cover in Bulgaria*; in the Yearbook of Sofia University Press “St. Kliment Ohridski”, Vol. 102, Book 2, Geography
5. Mekushinov Kr., 2009, *Viruses as a Biological Weapon*, in “Clinical Virology”, Dundarov S., and others, Sofia, Publisher “Medicine and Physical Education”, pp. 254-356
6. Kanev K., E. Belokonski, K. Katsarov et al., 2008, *Terrorism: Medical Risk Assessment and Management*, Sofia, edited by St. Tonev, Publishing Military-Medical Academy

7. Galev A., A. Kanev, E. Penkov, 2007, *The Threat of Bioterrorist Attack – the Challenge of the XXI Century*, Sofia, Publishing “Military Medicine”, no. 3, pp. 60-63
8. Badinski L., K. Gigov et al., 2004, *Handbook of Medicine Disasters (Catastrophes)*, Sofia, edited by V. Dragnev, Publisher “Classic Design”
9. Mekushinov Kr., D. Shalamanov, E. Savov, 2004, *Epidemiological Aspects of Biological Weapons*, in “Theory of Epidemiology”, Sofia, National Conference held on 14.05.2004.
10. Krasteva M., 1998, *Applied Enzymology*, Sofia, Publisher “Stars”

9.2.3. Books

1. Levi J., J. Smith, 2020, *How Food Works. Visual Explanation of Nutrition*, Sofia, Publisher “Bookmania”
2. Wallace-Wales D., 2020, *Uninhabited Land. Life after Warming*, Sofia, Publisher “Book Tiger”
3. Hoydonk R., 2019, *The World Tomorrow*, Sofia, Publisher “Horizon”
4. Todorova R., 2019, *Poison in the Plate*, S., Publisher “Rasper”
5. Von Weizsäcker E. W., A. Wijkmann, 2018, *Come on! Capitalism, myopia, population and destruction of the planet*, Report prepared for the 50th anniversary of the Club of Rome, Sofia, Publisher “Book Tiger”
6. Ridley M., 2018, *Evolution of Everything*, Sofia, Publisher “Ciela”
7. Doncheva Yu., 2018, *Code “Red”. Botox in the Mind*, Sofia, Publisher “Egmont”
8. Beron P., 2015, *Mysteries of Zoogeography*, Sofia, Publisher “East-West”
9. Shinia H., 2011, *The Microbial Factor. The New Health Revolution*, Sofia, Publisher “Ciela”
10. Shinia H., 2009, *The Enzyme Factor. The Diet of the Future*, Sofia, Publisher “Ciela”
11. Braungart M., W. McDonagh, 2009, *From Swing to Swing – Changing the Way We Produce*, Sofia, Publisher “Book Tiger”
12. Aslakhonov A., 2004, *Evolution of World Terrorism*, Sofia, Publisher: Bulgaria-Russia Forum
13. Bondev I., 1991, *The Vegetation of Bulgaria*, Sofia University Press “St. Kliment Ohridski”

9.2.4. Other Sources: Concepts, Strategies, Reports

1. Concept, 2019, *Concept for Application of European Standards in the Water Capital Management Policy of the Republic of Bulgaria at*

- National, Basin and Regional Level*, A. Vladikov, E. Georgieva-Arnaudova, Plovdiv University Press
2. Report, 2017, *State of the Planet. Education for the Earth and Rethinking Education for a Changing Planet*, Report of the Worldwatch Institute, Sofia, Publisher: “Book Tiger”
 3. Report, 2016, *National Report on the State and Protection of the Environment*, Report of the EEA, Sofia, Publisher: Ministry of Environment and Water (MoEW), Executive Environment Agency (EEA)
 4. Biserkov V. et al., 2015, *Red Book of the Republic of Bulgaria*, Sofia, Publisher: Bulgarian Academy of Sciences and MOEW
 5. Report, 2015, *European Environment – Status and Prospects*, EEA, Copenhagen
 6. Vassilev V. et al., 2013, *National Plan for Protection of the Most Significant Wetlands in Bulgaria: 2013-2022*, Sofia, Publisher: MOEW (Note: Separate Reports for Individual Years)
 7. Convention, 2010, *Convention on Biological Diversity*, ratified by a law adopted by the 37th National Assembly of the Republic of Bulgaria on February 29, 1996 in the State Gazette, no. 22 of 15.03.1996
 8. Strategy, 1998, *National Strategy for Biodiversity Conservation*, Sofia, Council of Ministers of the Republic of Bulgaria
 9. Report of the World Commission on Environment and Development UN, 1987, *Our Common Future*, Sofia, Publisher: “Book Tiger”
 10. *National Strategy for Management and Development of the Water Sector in the Republic of Bulgaria and the Action Plan in the short-term (2013-2015), medium-term (2016-2021) and long-term (2022-2037) perspective;*

X. FINAL EXAM FORMAT AND MODE OF GRADING

The Final Exam is written and lasts two academic hours.

The Final Exam consists of a combined grade from a genuinely authored student course project, according to the instructions of the lecturer. At the discretion of the lecturer, oral questions on the exam topics may be asked, when forming the final grade of the student.

Due to the scope and complexity of the subject, the presence of students during the planned in-classroom studies is strongly encouraged,

and students' in-class activities are taken into consideration, when forming the final grade.

The method for assessing the course project work of students includes: thorough review of the research paper of the student. This assessment is subject to the following principles: development of creative thinking; provoked research searches; going beyond the reproduction of knowledge; independent work with different sources of information; independent use of graphs / tables, etc. under text visualization tools.

This mechanism makes it possible to assess the following:

- Whether the student has developed the course project himself and knows the nature of the issue in details;
- Whether the student can highlight the problem and develop his/her arguments in a logical way, reflecting on already learned facts and patterns;
- Whether the student can orientate himself/herself in the specifics of the problems posed and provide sufficient evidence in developing a question;
- Whether the student can consider a certain economic or social phenomenon in its entirety;
- Whether the student can exercise profound independent interpretation of the studied facts and processes;
- Whether the student can express his judgments with precision of wording and with the help of specific terminology;
- The Final Exam grade is based on the Bulgarian Six-Grades System.

XI. FINAL EXAM CONSPECTUS / TOPICS

The Final Exam topics are organized into a single Conspectus of two Examination Corpuses: Corpus "Bioeconomy" and Corpus "Health Policies".

11.1. CORPUS "BIOECONOMY"

1. Introduction to the Course "Bioeconomy and Health Policies": Reasons to Emerge, Core Concepts, Research Approaches and Basic Theoretical Paradigms and Models, related to the Classical Economic Paradigm and Bioeconomy; Scope of Definitions – "Circle economy" / "Bioeconomy".

2. Bioeconomy as Science. Subject, Scope, Goals, Tasks.
3. Significance and Development of Transintegral Thinking: Biology – Economy – Health Policies; Evolvement of Bioeconomy and its Links to Human Health to form Health Policies.
4. The New Thinking Axis: Economic Capital – Human Capital – Nature Capital; Challenges and New Professional Practices of Work in Conditions of the Bioeconomy Paradigm.
5. The Resource “Fossil Fuels”, Oil Refinery, Oil Products, and Industrial Relations in the Classic Economic Scheme.
6. Biorefinery, Biofuels, and Bio-based Industries in the Bioeconomy Scheme.
7. Force-major Conditions and Anthropogenic Factor in Bioeconomy: Global Pollution of Environment, Fires, Floods, Explosions, Other Natural Disasters, and Emergencies.
8. Economic Externalities of the Classical Economic Paradigm and Modes of overcoming them through Introduction of the Principles of Circle Economy.
9. Blue Economy. Green Economy and the “Emerging Markets” based on Bioeconomy
10. Global Model for Bioeconomy
11. Bioeconomy in EU. The “Green Deal” of the EU
12. Bioeconomy in Bulgaria
13. Earth Sciences: Research Results on Lithosphere, Atmosphere, Hydrosphere, and Biosphere; Bioeconomy, Environment, and Waste-Free Technologies.
14. Sciences related to Plant World and Animal World and Bioeconomy: Botany, Zoology, Ecology, and Evolutionary Biology. Problems of Industrial Hunting and Fishing
15. Nature Capital and Bioeconomy: Use of Plant Material; Wood and Agroindustry Waste; Classic and Bioeconomy Paradigm to utilize Plant Waste.
16. Sciences related to Water, Water Capital and Bioeconomy.
17. Bioeconomy and “New Comprehension” of Life Sciences – Biochemistry, Biophysics, Molecular Biology; Avant-garde Fields in Human Medicine – Immunology, Toxicology, Virology, Pharmacology.
18. Synthetic Products of Nitrogen. Ammonia.

19. Agrochemical Industry; Fertilizers – Nitrogen and Nitrogen-Phosphorus Fertilizers.
20. Nitrogen-based Animal Feed.
21. Commercially-oriented Explosive Products
22. Food Industry. Animal and Vegetable Fats. Carbohydrates.
23. Cosmetics and Perfumery Industry Laziness. Soaps, Fatty Acids and Synthetic Detergents.
24. Pharmaceutical Industry: from Pharmaceutical to Biopharmaceutical Technologies.
25. Household Chemicals: Detergents, Paints, Their Application and Replacement with Non-Toxic Organic Products
26. Textile Industry. Natural Fibers: Cotton, Wool, Silk. Biotextile and Synthetic Polymers: Nylon, Polyester, Acrylic Productions, Vinyl, Others; Their Application as Medical Products.
27. Manufacture of Glass and Products of Glass.
28. Commercial Plastics, Biopolymers and Medical Polymers.
29. Production of Synthetic Tires and Biodegradable Tires
30. Classical Biotechnology. Microbial Biotechnologies. Commercial End-Products of Fermentation.
31. New Commercial Products, designed as a Result of Cellular and Genetic Engineering.
32. Agrobioindustry. Biofertilizers.
33. Overcoming Protein Starvation in a Global Scale. Proteins and Peptides – Separation and Formulation
34. Smart Technologies
35. Bioprocessing Technologies
36. Nanotechnologies
37. Ecological Renewable Energy Sources
38. Biosecurity and Defense against Bioterrorism.
39. Biosecurity and Cybersecurity.
40. Biosecurity and Personal Data Protection.

11.2. CORPUS “HEALTH POLICIES”

1. New Ethical Considerations and Practices, related to Ecological Indicators and Bioeconomy Paradigm, and to Personal and Public Health, as well as to the New Generation of Health Policies.

2. Problems and Consequences for Human Health, accounting Air Pollution, Waste Waters Pollution and Pollution of Soils in organizing the Classical Economic Paradigm, based on Petroleum-Chemical Industry, Oil-based Productions, and Synthetic Chemistry for reaching Industrial Goals.
3. Prerequisites to transit from Conservative Health Policies to Health Policies of New Generation in the conditions of Bioeconomy
4. Health Policies in Production, Processes, and Consumption – based on Inorganic Chemistry Industry
5. Health Policies in Production, Processes, and Consumption – based on Organic Chemistry Industry
6. Health Policies in Production, Processes, and Consumption – based on Polymer Chemistry Industry
7. Health Policies in Production, Processes, and Consumption – based on Biochemical and Biotechnological Technologies
8. Health Policies in Production, Processes, and Consumption – based on Smart Technologies
9. Biosecurity, “New Diseases” (Diabetes, Asthma, Allergies, Cancer), and Personalized Medicine.
10. Environmental Protection Policies and Natural Harmony between Man and Nature, and the Conversation on Human Health.

XII. COURSE PROJECT INSTRUCTIONS

12.1. INSTRUCTIONS ON THE COURSE PROJECT CONTENTS

- Students should compose their own course project, which must be a genuine text on one of the topics studied in the course;
- The topic of the course work is specified along with the Instructor and is prepared in a volume of 8-10 printed pages (A4);
- Students should show factual readiness and a high level of mastery and work with specialized terms, concepts, theories;
- Students can use popular and / or highly specialized sources of information, both in Bulgarian and in foreign languages, on which to base their arguments in defense or rejection of a standpoint;
- Students defend the course project on the day of the exam;

12.2. INSTRUCTIONS ON THE COURSE PROJECT TECHNICALITIES

The course project must contain on the first page:

- In the upper right corner – the words: *To the Attention of Assoc. Prof. A. Vladikov, PhD*”;
- In the middle – the words: *Course project on “Bioeconomy and Health Policies” on the topic*” (the student adds his own title in the context of the given thematic area);
- In the lower right corner – name and surname of the student, major, faculty number;
- At the bottom middle – the words: *The Course Project is sent to*”. (Indicate the date on which the student intends to send his / her course project by e-mail);
- Font: Times New Roman – 12;
- Spacing – 1.0;
- Tables, graphs, figures, etc. can be presented, but not more than 5 / five / such elements in total are allowed, and their content in relation to the text should not be more than 50%;
- Full list of the sources of information used in the Course Project – bibliography / internet, as one of the international / national recognized modes of citation.
- The style of speech is a matter of personal choice!
- The text must not contain spelling, punctuation, stylistic and other errors;
- Course Projects without listed sources of information – ARE NOT GRADED!

12.3. COURSE PROJECT SUBMISSION

- Course Projects may be submitted either in English, or in Bulgarian languages;
- Students shall submitted their Course Projects **a week before the Final Exam Date on the following email: contact@atanasvladikov.eu**

