

National Technical University of Ukraine
“Kyiv Polytechnic Institute”

Syllabus of the Discipline

«Basis of sustainable development in society»

for masters of the university

Background

Sustainable development is dynamically developed concept which includes different aspects and interpretations. This concept represents world vision corresponded to local and cultural circumstance and requires development process meets the needs of the present without compromising the ability of future generations to meet their own needs.

Education for sustainable development is an initiative for whole our life where personalities, institutes and societies have to participate for considering tomorrow as a day owned each of us since otherwise it will belong to nobody.

Sustainable development concept develops constantly. Therefore we must have clear view of the sustainable development meaning and goals to provide education for sustainable development.

Course “Analysis of sustainable development in society” belongs to newest educational courses and implies interdisciplinary and system approach to studying of main problems of environment and human interaction in the context of sustainable development concepts. Sustainable development problems’ studying has to be included to educational program on speciality or organized as separate course according to the Rio Summit (1992 UN conference on the Environment and Development). Organization of the course at NTUU “KPI” implements the second mentioned approach. Students obtain knowledge complex within the course on three aspects of sustainable development: society, environment and economic-technological line as sustainable development driving force.

Society: understanding what society’s institutions are, their role in transformation and development; understanding what democratic systems are, their role in providing with opinion representation, consensus reinforcement and overcoming disagreements.

Environment: conscience what resources physical environment has, how much environment is instable and how it is influenced by human activity and decisions with showing settled intention to account ecological disquietudes within development of social and economic policy.

Economic-technological line: consideration of all limitations and potential opportunities related to economic growth and their influence on society and environment when aspiring for determination of the private and public consumption level that causes concern in the context of environment and social justice.

Course studying bases on students’ knowledge of main concepts of chemistry, physics, math, economy, sociology and is oriented towards formation of habits for system approach to research and solution sustainable development problems and abilities for correct assessment of local and distant consequences of made decisions in the case of environment.

The course is for 36 lectures hours and individual task (essay).

II. Contents of educational materials

Introduction. Sustainable development concepts as discipline of modern higher technical education.

Issue 1. Common items on sustainable development

Theme 1. Prehistory and main sustainable development concepts. What is sustainable development; Unsustainable development examples; Rational society: utopian and reality problems; Who is an author of “sustainable development” concept; Sustainable development: formation of the concept; Human role in biosphere evolution; Problem statement of the necessity of transition towards sustainable development at international level; Globalization problems.

Theme 2. Globalization and sustainable development problems. Main treats with which mankind meets today: Biosphere (all flesh), Hydrosphere (oceans, lakes and rivers), Atmosphere (the air surrounding Earth) and Lithosphere (the Earth’s crust).

Theme 3. World community’s main documents for sustainable development. Rio de Janeiro Declaration on the Environment and Development; Johannesburg Declaration on sustainable development; UN, Aarhus Convention; Requirements to information representation; Kyoto Protocol of The United Nations Framework Convention; Ecological Agreement of Cities; The Ukrainian Cabinet’s order “About Approbation of State Program Concept for Environment Monitoring”; Melbourne Communiqué; World Congress of Chemical Engineering; The UN Decade of Education for Sustainable Development (2005-2014).

Theme 4. World community’s main documents for sustainable development (continuation). World Development Report 2003; Sustainable development in a fast-paced world; transformation of institutions, growth and life quality; Millennium Development Goals – representation of the new phase in humanity development; Human Development Report 2003; Millennium Declaration 2005; Millennium Development Goals Progress Report 2005.

Theme 5. Sustainable development problems in Ukraine. Ukraine national report for life harmonization within environment; Brief geographic characteristics of Ukraine; Natural-resource potential of Ukraine; Economic heritage and ecological consequences; International cooperation efficiency.

Issue 2. Sustainable development assessment (indicators and indices)

Theme 6. Sustainable development indicators and indices. What indicators are; What are indicators needed for; Sustainable development indicators systems; SDI system developed by UN Commission for Sustainable Development; SDI system of Organization for Economic Cooperation and Development; SDI system for nature

management improvement in Central America; World development indicators by World Bank; Ecological indicators set for East Europe, Caucasus and Central Asia (UN Economic Commission for Europe).

Theme 7. Sustainable development indicators and indices (continuation). Aggregative measures of sustainable development – indices; Approaches to aggregative indices construction; A System for Integrated Environmental and Economic Accounting; Genuine Saving; Human Development Index; Living Planet Index; Ecological Footprint Index; Environmental Sustainability Index; Population Health Indicator; Real Progress Index and Sustainable Economic Wellbeing Index.

Theme 8. Sustainable development indicators and indices (continuation). Environmental Sustainability Index ESI-2005, description and examples of calculation; Environmental Performance Index EPI-2006, 2008: range of use.

Theme 9. Global assessment system for sustainable development. Global modeling method of sustainable development processes in human life quality and safety context; Influence the whole complex of main threats on sustainable development; World data centers network as instrument of sustainable development processes' global analysis; Countries comparison on sustainable development indices; Conclusions.

Theme 10. Environmental monitoring. Concept of State program for natural environment monitoring; Laws for ecological monitoring in Moscow; Air quality monitoring, Canada; Air pollution monitoring, Saint Louis; State monitoring system of natural environment; Air quality monitoring organization at a plant based on experimental design principles.

Issue 3. Sustainable development in economic-technological measure.

Theme 11. Sustainable development, technology and engineering. Human development models; Technology definition and its role in human development; ABC-book of sustainable technology and its development; Society's sustainable development problems and chemical engineering; How to change technological schemes; What share have engineers in sustainable development; What can be achieved at a plant when using sustainable development principles.

Theme 12. Sustainable technologies and “Cleaner Production” concept. Development of the approaches for environmental protection; What is Cleaner Production; Main concepts from the field of environmental protection and cleaner production; Clean production project; Planning and organization of cleaner production project; Variants generation.

Theme 13. Sustainable development, technology and standards. Standards application examples. Standards series “Environmental management systems” ISO 14001 – ISO

14047; Examples of standard application in companies; Eco-efficiency assessment; Resource saving technological schemes and water networks design; Estimation of sustainable development programs execution by companies (BRIDGES to Sustainability).

Theme 14. Sustainable development, technology and technological safety.

Issue 4. Sustainable resource management

Theme 15. Natural capitalism – What is it? Introduction, Factor 10 concept and natural capitalism; Ordinary capitalism; Capitalism allowing for biological systems; Resource efficiency; Nature's imitation; Service streams; Investments for natural capitalism; Automotive industry as an example for other branches when natural capitalism principles implementing.

Theme 16. Basics of the natural resource management theory. Main laws and rules of resource management; Kommoner's "Garland of laws"; Natural and technological resources; Modern sustainable development assessment methodologies on the basis of natural capitalism theory; Estimators for resource sustainable management (sustainability ratio).

Theme 17. Modeling systems: within limits and outside – Can mankind succeed in global catastrophe's prevention and provide sustainable future or not? Review on growth limits; Modeling: within limits and outside; What is "World 3"? Limits and limits absence; World 3 model: two possible scenarios; Why do falling outside the limits and collapse occur? Limits broadening in the model by technologies; Growth limits, 30 years after; Transition to sustainable world.

III. List of essays' themes (approximate and partial)

1. Sustainable development. Construction. Energy consumption.
2. Transport in Ukraine: today vision and in a future.
3. Global Warming and growth of temperatures.
4. Countries' profiles according to sustainable development.
5. Sustainable development indicators and indices.
6. Globalization and education development.
7. Sustainable development in Ukraine: problems and possibilities.
8. Sustainable development indices.
9. Living planet Earth
10. Sustainable development indicators and indices, global dimension.
11. Global treats' influence on sustainable development.
12. Sustainable development of autonomous republic of Crimea
13. Ecologically clean engines.
14. Sustainable development concept and worldwide tourism.
15. Kyoto Protocol, implementation dynamics.
16. Eco-efficiency of Ukrainian economy.

IV. Tutorial instructions

Discipline lecturing is planned carrying out in concert with works on students' own. Lecturing is accompanied by illustrative materials application as MS PowerPoint slides.

V. Literature

Main list

- 1) *Лосев К.С.* Экологические проблемы и перспективы устойчивого развития России в XXI веке. - М.: Космосинформ, 2001. - 400 с.
- 2) *Биченок М.М., Трофимчук О.М.* Проблеми природно-техногенної безпеки в Україні. –К.: УІНСіР, 2002. – 153 с.
- 3) *Маршалл В.* Основные опасности химических производств: Пер. с англ.– М.: Мир, 1989. – 672с.
- 4) *Данилов-Данильян В.И., Лосев К.С.* Экологический вызов и устойчивое развитие. Учебное пособие. - М.: Прогресс-Традиция, 2000. - 416 с.
- 5) *Кузнецов О.Л., Кузнецов П.Г., Большаков Б.Е.* Система природа-общество-человек: Устойчивое развитие. - Москва-Дубна: ГНЦ РФ ВНИИгеосистем; Международный университет природы, общества и человека "Дубна", 2000. - 282 с.
- 6) *Згуровський М.З.,* Україна в глобальних вимірах сталого розвитку / Дзеркало тижня, №19, 2006 р.
- 7) *Сталій* розвиток суспільства: 25 запитань та відповідей. – Тлумачний посібник.- К., Поліграф-експрес, 2001.- 28 с.

Additional list

- 8) *Дорогунцов С.И., Ральчук А.Н.* Управление техногенно-экологической безопасностью в контексте парадигмы устойчивого развития: концепция системно-динамического решения. – К.: Наукова думка, 2002. – 200 с.
- 9) *Медоуз Д.Х., Медоуз Д.Л., Рандерс Й.* За пределами роста. Учебное пособие. – М.: Изд. Группа «Прогресс», «Пангея», 1994. – 304 с.
- 10) *Научно-методические аспекты анализа аварийного риска / В.Г. Горский, Г.А. Моткин, В.А. Петрунин и др.* – М.: Экономика и информатика, 2001. – 320 с.
- 11) *Хенли Э. Дж., Кумамото Х.* Надёжность технических систем и оценка риска: Пер. с англ. – М.: Машиностроение, 1984.– 528 с.
- 12) *Количественная оценка риска химических катастроф / В.М. Колодкин, А.В. Мурин, А.К. Петров, В.Г. Горский; Под ред. В.М. Колодкина.* – Ижевск: Изд. дом “Удмуртский университет”, 2001. – 208 с.
- 13) *Кузнецов О.Л., Кузнецов П.Г., Большаков Б.Е.* Устойчивое развитие: синтез естественных и гуманитарных наук. - Дубна: Международный университет природы, общества и человека "Дубна", 2000. - 282 с.

- 14) *Жолдасбеков М.Ж., Шалахметов Г.М., Аубакир Д.А.* Философия информационной цивилизации и глобальная концепция устойчивого развития / Устойчивое развитие. Наука и Практика, №1/2002
- 15) *Щеулин А.С.* Устойчивое инновационное региональное развитие как научно-прикладное направление / Устойчивое развитие. Наука и Практика, №2/2004
- 16) *Петров А.Е.* Подходы к познанию Пространства и Времени в эволюции глобальной системы “природа - общество - человек” / Устойчивое развитие. Наука и Практика, №1/2002
- 17) *Кузнецов О.Л., Большаков Б.Е.* Определение предмета и метода проектирования устойчивого развития в системе Природа-Общество-Человек / Устойчивое развитие. Наука и Практика, №1/2002
- 18) *ЛЕВАШОВ В.К.* Глобализация и устойчивое развитие / Устойчивое развитие. Наука и Практика, №1/2002
- 19) *В.С. Стетин,* ЦИВИЛИЗАЦИОННЫЙ ВЫБОР и сценарии мирового развития / Экология и жизнь, №2, 1998
- 20) *Н.Н. Моисеев,* Экология и ноосфера / Экология и жизнь, №3, 1999
- 21) *А.Д. Янишин,* Научные проблемы охраны природы и экологии / Экология и жизнь, №3, 1999
- 22) *С.К. Шойгу,* От абсолютной безопасности к приемлемому риску / Экология и жизнь, №3, 2000
- 23) *Н.Н. Моисеев,* Размышления о рациональном Обществе / Экология и жизнь, №1, 2001
- 24) *Н.Н. Моисеев,* ЭКОЛОГИЧЕСКАЯ ПОЛИТИКА И МАТЕМАТИКА / Экология и жизнь, №4, 2002
- 25) *А.П. Назаретян,* Демографическая утопия «устойчивого развития» / Экология и жизнь, №4, 2002
- 26) *Бондаренко В.М.* Теоретические новации в обеспечении устойчивого диалога между цивилизациями / Устойчивое развитие. Наука и Практика, №1/2002
- 27) *Кургинян С., Кудинова А., Репин В.* Что есть устойчивое развитие? // Завтра. 1995. № 16
- 28) *Урсул А.Д.* Перспективы эволюции государства в модели устойчивого развития. // Общественные науки и современность. 1996. № 2.
- 29) *Клименко В.В.* Россия: тупик в конце туннеля? // Общественные науки и современность. 1992. № 5.
- 30) *Моисеев Н.Н.* Природный фактор и кризисы цивилизации. // Общественные науки и современность. 1992. № 5.
- 31) *Хайек Ф.А.* Пагубная самонадеянность. Ошибки социализма. М., 1992.
- 32) *Назаретян А.П.* Агрессия, мораль и кризисы в развитии мировой культуры. (Синергетика исторического процесса). Курс лекций. М., 1996.
- 33) *Янишина Ф.Т.* Эволюция взглядов В.И.Вернадского на биосферу и развитие учения о ноосфере. М.: Наука, 1996. С. 210.
- 34) *Бабосов Е.М.* Катастрофы: социологический анализ. Минск: Наука и техника, 1995

- 35) *Тойнби А.Дж.* Постижение истории: Пер. с англ. -М.: Прогресс, 1991
- 36) *Е.Ф.Корочкин.* Экология и устойчивое развитие России. Министерство природных ресурсов Российской Федерации, Москва, 2002.
- 37) Стратегія розвитку України. До програми діяльності Тимчасової спеціальної комісії Верховної Ради України з питань майбутнього.
- 38) *K. Mulder.* Sustainable Development for engineers, Delft Un-ty of Technology, The Netherlands, 2006, 288 p.

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