

DIGIT-Bio-TECH

2019-1-BG01-KA203-062371

M.Sc. PROGRAMME “GREEN BIOTECHNOLOGY AND ICT”

SYLLABUS

COURSE:

BIOETHICS AND MODERN BIOTECHNOLOGY

AUTHORS:

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Academic work		Type	Number of classes
In-class work	Lectures		30
	Seminars		20
Total in-class work			50
Out-of-class work	Presentations		25
	Projects		20
	Self-guided library/database work		30
Total out-of-class work			75*
Total of academic work			125
ECTS credits in-class work			2.0
ECTS credits out-of-class work			3.0
Total ECTS credits			5.0
№	Grading		% of the grade
1.	Workshops/discussions of reports and papers		20 %
2.	Case studies		20 %
3.	Homework assignments and tests		10 %
4.	Exams		50 %

* One credit corresponds to 25 hours of work.

Outline of the course

This LO presents educational content focused on (1) the ethical and legal aspects or problems of the genetic engineering in (a) agriculture and food production as well as (b) for some selected medical applications; and (2) on all ethical and legal questions related to the use of the Crispr-Cas technique and other methods of “genome editing” in (a) plant and animal breeding and (b) gene therapy in humans, especially in the case of germ line therapy. – Hereby the main principles of bioethics will be presented and discussed. The trainee should learn to recognize and understand the application of ethics to these fields of modern biotechnology. Furthermore, the trainee can improve her or his awareness of all aspects of genetic engineering and can train her or his skills for arguing ethical in scientific or everyday contexts. This may be important for an ethically sensitive working in these areas of biotechnology. It is also focused on (3) the ethical aspects or problems of the human behaviour concerning environment and nature, esp. related to nature conservation and species protection. In particular the LO deals with the basic decision between (a) an "anthropocentric" and (b) a "non-anthropocentric" view, because the instrumentalist view of nature contrasts with a view that emphasizes the "intrinsic value" of nature, but places it on different levels (pathocentric, biocentric, ecocentric and holistic natural ethics). Hereby the main principles of the “environmental ethics” will be presented and discussed. The trainee should learn to recognize and understand the importance of “environmental ethics” for acting in the area of modern biotechnology. Furthermore, she or he can improve her or his awareness of the possible positive or negative effects by human interventions into nature and can train her or his skills for arguing ethical in scientific or everyday contexts. This may be important also for an ethically sensitive working in some areas of biotechnology.

Furthermore, this LO presents educational content focused (1) on the ethical and legal aspects or problems of different techniques of cloning in (a) agriculture and food production as well as (b) for the purpose of xenotransplantation; and (2) on all ethical and legal questions related to the use of the different methods of “synthetic biology” for (a) optimizing the “genetic outfit” of bacteria and plants for agricultural or pharmacological purposes as well as (b) for the purposes of gene therapy in humans, especially in the case of germ line therapy. – Hereby the main principles of bioethics will be presented and discussed. The trainee should learn to recognize and understand the application of ethics to these fields of modern biotechnology. Furthermore, she or he can improve her or his awareness of all aspects of cloning and synthetic biology and can train her or his skills for arguing ethical in scientific or everyday contexts. This may be also important for an ethically sensitive working in these areas of biotechnology. It is also focused on the basic principles of environmental law and the legal regulation of sustainability. These principles will be presented and discussed on the basis of national and international law and illustrated by some examples (e.g. sustainable forest management, by which the conflict between "forest ethics" on the one hand and "business ethics" on the other hand will be treated). The trainee should learn to recognize and understand the importance of “environmental law” for a better interacting with nature in the context of economy and different applications of modern (bio) technology. Furthermore, the trainee can improve her or his awareness of possible consequences of different legal regulations and can train her or his skills for arguing juridical in scientific or everyday contexts. This may be important also for a more sustainable working in the area of biotechnology.

Educational goals

This LO concerns:

- "genetic engineering" in agriculture and food production by discussing (a) the safety risks to health and the environment, which can occur in particular in the case of a release of genetically modified organisms (GMO); and (b) the possible risks associated with the consumption of genetically modified food
- the possible ethical problems related to the new method of "Genome Editing" like Crispr-Cas technique for the production of new pharmacy or the purposes of gene therapy in humans;
- the philosophical basics of environmental and nature conservation ethics as well as
- the practical tasks of environmental ethics with particular regard to the protection of life rights of non-human living beings on the one hand and a respectful and sustainable handling of nature as a whole on the other
- the animal-ethical aspects of animal cloning for agriculture or for the transplantation of genetically modified animal organs into humans in the sense of xenotransplantation;
- the ethical and related legal aspects to Synthetic Biology in the sense of the reprogramming, optimization or "bottom-up"-creation of living beings for agricultural or pharmacological purposes
- the legal requirements for socially and ecologically compatible behaviour which (e.g. in economy) is able to ensure the preservation or renewal of natural resources; in this context, particular importance is attached to (a) technical feasibility on the one hand and (b) political enforceability of environmental measures on the other (balancing of conflicts of interest, financing of environmental measures and control of compliance with environmental legislation); as well as it concerns
- the law (and ethics) of sustainability: In addition to (a) the general aspects of sustainable action, this LO deals in particular with (b) the example of sustainable forest management ("mixed and continuous forest"), in which climate and species protection, interests of industrial wood use and biotechnologically based breeding methods are combined.

Expected outcomes

Knowledge and Skills:

As a result of the training students will be able to:

- understand the main bioethical problems and diverse ethical arguments in the field of genetic engineering
- understand the problem of control or retrievability of into the environment released genetically modified organisms (GMO)
- understand the safety risks to health and the environment that could occur by genetic engineering
- understand the problem of consumer acceptance, product labelling and chemical detectability of a genetic modification of agricultural products
- understand the ethical aspects of the use of methods of "genome editing" (like the Crispr-Cas-technique) in plant and animal breeding
- understand the possible application of genome editing in the context of germ line therapy

- recognize future ethical problematic developments in this field in the sense of “technology assessment”
- recognize the different challenges that environmental ethics has to face in its various fields of application ("ethics of resources", "animal ethics" and "ethics of nature")
- understand the different levels at which environmental ethical reflection plays a role (philosophical, politico-legal, and casuistic level)
- understand the different approaches within environmental ethics; and here in particular the basic decision between (a) an "anthropocentric" and (b) a "non-anthropocentric" view (like a “pathocentric” or “ecocentric” approach)
- recognize the importance of environmental awareness and an ethically responsible behaviour in dealing with all living creatures and ecological systems
- recognize the possible safety risks of producing chimeras by cloning
- understand the human-ethical aspects of the xenotransplantation of genetically modified animal organs (problem of the scarcity of transplants, danger of zoonosis, etc.)
- recognize the the ethical and related legal aspects related to the “top-down”-reprogramming and optimization of bacteria or the "bottom-up"-creation of living beings
- understand the possible effects of the "creation of life" on our relationship to life in general (concept of life as well as human nature and self-image)
- recognize the different legal questions related to the conservation of nature and the protection of species in the sense of “biolaw”
- understand the challenges for a legal regulation of measurements in order to a sustainable interaction between humans and nature
- recognize the conflicts between economy and ecology which have been regulated by law
- understand the importance of a law of sustainability on a national as well as on an international level.

Problem-solving skills: Decision making, creative thinking, analytical, research and interpreting skills

Digital competencies and skills: strategic web and database searching; data analysis and presentation; data management and preservation; digital communication; networks and file management.

Personal skills: initiative and independence, time management, good oral and written communication skills, teamwork.

Syllabus

№	Topic	Number of classes
1.	Unit 1 BL - Bioethics in the field of genetic engineering and environment	25 h
1.1	Genetic Engineering. Genetic engineering in agriculture: from "transgenic" to "genome edited" organisms. Genetic engineering for medical purposes: germline gene therapy, genome analysis and pharmacogenomics.	5 h
1.2	Bioethics in the Field of Environment (Nature). Introduction. Three central tasks of environmental ethics. Resource ethic. Animal ethics. Natural ethics.	4 h
1.3	The three levels of environmental ethical reflection. The philosophical level. The political-legal level. The level of environmental protection.	3 h
1.4	Main approaches of environmental ethics. The anthropocentric view. The non-anthropocentric view.	3 h
1.5	Seminars	10 h
2.	Unit 2 AL – Synthetic Biology and Cloning	25 h
2.1	What “Synthetic Biology” means. Safety issues in synthetic biology.	2 h
2.2	Sustainable Models for the Protection and Use of Intellectual Property. Challenges of the foreseeable new genetic engineering debate. Overall assessment.	2 h
2.3	Cloning of Animals and Humans. Introduction. Biomedical research and application. Legal aspects. Ethical aspects. Conclusions and options for action.	2 h
2.4	Law and Ethics in the Field of Environmental Sustainability. Introduction. Europe's commitment to sustainable development. Regulation of environmental behavior.	2 h
2.5	Instruments. Instruments to enforce the environmental policy (environmental planning). Instruments to regulate the environmental behavior. Principles for political and legal measures.	2 h
2.6	4Regulation of Environmental Behaviour. Instruments to enforce environmental policy (planning). Instruments to regulate environmental behavior.	2 h
2.7	The Multidimensional Sustainability Strategy.	1 h
2.8	Equal opportunities as a universal ethic of globally integrative sustainability.	2 h
2.9	Seminars	10 h