Descriptions of foundation courses in English for students of the Doctoral School of Experimental and Preventive Medicine

Basic Module 1st/subject credit *(min. 38 credit)*													
Basic modul													
Course name and course code	**Name of department coordinator**	**Total number of classic (hours)**	**Requirements**	**Number of credits in semesters**								**Total credits**	**Evaluation**
				1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**		
Computer-assisted research methodology AOKDI-BAS-01	Prof. Dr. Ferenc Peták DSc Department of Medical Physics and Informatics	28	O	-	6	-	-	-	-	-	-	6	B5
Scientific communication and publication. Methods, rules, ethics AOKDI-BAS-02	Prof.Dr. Ernő Duda Dsc Department of Medical Biology	14	O	-	3	-	-	-	-	-	-	3	B5
Biostatistics lecture AOKDI-BAS-03	Prof. Dr. Tibor Nyári Dsc Department of Medical Physics and Informatics	28	O	6	-	(6)	-	-	-	-	-	6	B5
Biostatistics practice AOKDI-BAS-04	Prof. Dr. Tibor Nyári Dsc Department of Medical Physics and Informatics	28	O	2	-	(2)	-	-	-	-	-	2	B3
Biomedical ethics AOKDI-BAS-05	Dr. habil. Oguz Kelemen PhD Department of Behavioral Scientes	14	O	-	3	-	-	-	-	-	-	3	B5
Total credit of Basic Modul 1-st				**8**	**12**	(8)	**-**	**-**	**-**	**-**	**-**	**20**	

1 O (Obligatory subject)
2 E (Elective subject)
3 CE (Compulsory elective subject)

Course description
Informing students on course requirements

From September 2025

Program: **PhD day- training for SH students and self-cost students**
Course: **Computer-assisted research methodology**
Course code: **AOKDI-BAS-01**
Academic year/Semester: **2025/26 2nd semester**
Educator and contact details (e-mail): **Prof. Ferenc Peták, email: petak.ferenc@med.u-szeged.hu** **Dr. József Tolnai, email: tolnai.jozsef@med.u-szeged.hu**
Type of course: lecture/**seminar/practice**/laboratory
Weekly hours of the course: **2**
Credit vale of the course: **6**
Type of examination: **final exam at the end of semester**, practice exam, other:……..
Preliminary requirements (preliminary academic performance or completed course required to fulfill the purposes and requirements of the course): **none**
Purpose of course: **The primary aim of this course** is to equip PhD students with both practical skills and theoretical knowledge in computer science, covering the entire process from data analysis to scientific publication. Students will gain a comprehensive understanding of how to effectively utilize modern information technologies to support their work in the life sciences.
Outcome requirements of the course (specific academic results to be established by the course): **Knowledge:** • Possesses the knowledge needed to process biomedical data into tables. • Being familiar with the basic concepts of spreadsheets (relative, absolute, and mixed references, ranges, data import and input, data validation, autofill, charts, filtering, sorting, diagrams, functions, basic statistical solutions, large tables, linear regression, and pivot tables) • Knows the effective and modern presentation techniques and principles of presentation. Familiar with interactive and none-slide based presentation tools (Prezi, Mentimeter) • Knows the health data available on the web. Also familiar with the methods of preparing and evaluating online forms. • Knows the basic typographic concepts for document editing (styles, table of contents, figures and captions, list of figures), and general document editing

principles. Understands the use and benefits of reference management software.
- Being familiar with forms and basic concepts of scientific data publication. Knows the information and literature search, and the international scientific life science databases.

Competences:

- Having the skill to solve tasks on health data in a spreadsheet program. Creates charts, graphs, and pivot tables. Sort and filter data. Apply mathematical and statistical functions.
- Able to create appropriate presentations with animations not only in standard slide-based but also in virtual canvas-based and interactive presentation software.
- Able to find data in open health databases. Capable of creating, sharing, and evaluating online forms.
- Creates, modifies, and applies styles in a word processor, inserts figures and captions, generates table of contents and list of figures, creates a bibliography, manages cross-references, and footnotes.
- Able to use basic telemedicine tools, artificial intelligence and 3D printing techniques in the field of medicine.

Attitudes:

- Confidently apply the spreadsheet techniques they have learned. Strives to maintain data integrity, process, and present data accurately.
- Open to the use of familiar presentation techniques and strives to produce consistent-looking, easy-to-follow presentations.
- Confidently perform search and retrieval tasks from open health databases. Confidently create online questionnaires.
- Strives to apply typographic principles to the production of sophisticated and easy-to-follow electronic and paper-based documents.
- Open to telemedicine applications for the use and development of tools.
- Open to the use of artificial intelligence and 3D printing tools to support medical research.

Autonomy and responsibility:

- Independently solve the spreadsheet and data processing tasks arising in his/her profession.
- Creates and presents his/her electronic presentations independently.
- Autonomously solve the search for open biomedical data.
- Independently create and evaluate online questionnaires.
- Solves word processing and document management tasks independently.

Independently can interpret the basic concepts of telemedicine, biomedical applications of artificial intelligence, and 3D printing

Topics:

1. Introduction and fundamentals

- Course objectives, requirements, evaluation, CooSpace, eduID, Office 365, digital environment
- Concept and importance of computational research methodology in life sciences

- Fundamental concepts of computer-based data collection, visualization, and processing

2–6. Processing of biomedical Data

- Data entry options, preprocessing, and error management
- Formulas, functions, sorting, filtering, and basic statistical methods
- Charts, subtotals, pivot tables / summaries
- Scientific data visualization (e.g. Excel, basics of R)
- Role of large language models (LLMs) in data collection, preprocessing, and simple evaluation
- Advanced data processing tools and freely available software

7. Artificial Intelligence in life sciences

- Basic concepts of AI, machine learning, and deep learning
- Practical applications in biomedical and health research

8–9. Scientific data presentation and visualization

- Structure and types of scientific publications
- Graphical presentation of research results (e.g. SigmaPlot)
- Common visualization errors and related ethical considerations

10–11. Scientific presentation design

- Presentation tools (PowerPoint, Prezi, Mentimeter, interactive solutions)
- Content and design principles: structure, message, visual coherence
- Opportunities for AI and LLMs in supporting scientific presentations

12–13. Scientific documentation and reference management

- Advanced text editing: styles, references, automatic table of contents, headers/footers, cross-references
- Integration of figures and diagrams into scientific documents
- Reference management tools: EndNote, Zotero, Mendeley
- AI tools for supporting scientific writing and reference handling
- Creating electronic questionnaires and data collection ethics

14. Information retrieval and research data management

- Use of international databases in life sciences (PubMed, Web of Science, Scopus, etc.)
- Electronic systems for managing scientific communications (ORCID, ResearchGate, Scite)

Supporting methods to achieve learning outcomes:

Lectures and practical demonstrations

- Thematic lectures on the theoretical foundations and practical applications of computational research methodology.
- Instructor-led demonstrations using data analysis and visualization software (Excel, SigmaPlot, PowerPoint, EndNote, etc.).
- Presentation of the operation of artificial intelligence and large language models through concrete research examples.
- Interactive exercises where students perform data entry, preprocessing, error handling, statistical analysis, and data visualization on real research datasets.
- Practical assignments for preparing scientific presentations and manuscripts (e.g. PowerPoint design, inserting EndNote references).

- Use of Mentimeter and similar online tools for interactive polls and knowledge checks.
- Practice tasks and tests shared via the CooSpace platform to reinforce the functions of the software tools introduced in class.
- Literature search reports and exercises involving publication databases.

Case studies and problem solving
- Group analysis and discussion of real-life research scenarios (e.g. data-processing errors, misinterpretation of visualizations, publication ethics dilemmas).
- Discussion of the responsible use of AI tools through examples (e.g. use of LLMs in scientific writing).

Use of digital learning environments
- Document sharing, collaborative editing, and assignment submission through CooSpace and Office 365 platforms.
- eduID-based access to international scientific resources (PubMed, Scopus).
- Controlled and reflective use of online tools (AI chatbots, ChatGPT, ResearchRabbit, etc.) to support the research process.

Evaluation of the acquisition of expected learning outcomes:

Requirements:
Course requirements during the semester
- Active participation in lectures and seminars.
- Independent completion and timely submission of written assignments and the final written examination paper during the semester.

Examination requirements:
Assessment and grading
The performance during the semester is evaluated on a five-point scale (1–5) based on in-class activity, interim assignments, and the final submitted tasks.
- Maximum score achievable in the final examination: 200 points
- Maximum score for mid-semester assignments: 100 points
- Total obtainable points: 300 points

Attendance and active participation in seminars are rewarded with additional bonus points.
Grades of the course are determined as follows:
- 0–139 points: Failed (1)
- 140–179 points: Passed (2)
- 180–219 points: Satisfactory (3)
- 220–259 points: Good (4)
- 260–300 points: Excellent (5)

Mandatory reading list:
- Comprehensive and up-to-date literature covering the entire scope of the course is not available.
- The specialized books relevant to individual subtopics generally exceed the depth required for this course, and their availability may vary over time.

Recommended reading list:

• Instructor-prepared teaching materials distributed during classes • Instructor-developed e-learning materials

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Course description

Informing students on course requirements

From Sept 2025

Program: **PhD day- training for SH students and self-cost students**
Course: **Scientific communication and publication. Methods, rules, ethics**
Course code: **AOKDI-BAS-02**
Academic year/Semester: **2025/2026, 2nd.**
Educator and contact details (e-mail): **Prof. Dr. Ernő Duda DSc, duda@brc.hu**
Type of course: **lecture/**seminar/practice/laboratory Lectures Exam date:
Weekly hours of the course: **1** (14 hours)
Credit vale of the course: **3**
Type of examination**:** final exam at the end of semester, practice exam, other: final written exam at the end of semester (brief answer questions)
Preliminary requirements (preliminary academic performance or completed course required to fulfill the purposes and requirements of the course): **none** (be a PhD student)
Purpose of course: To help students to navigate in the (natural) sciences of 21st century. Planning, execution, documentation of experiments. Reproducibility, significance of results. Ways and tools of scientific communication. Posters, oral presentations, publications, PhD theses, chapters, book, patents. Open science, open access, blockchain in science. Peer review, predatory journals, impact of publications.
Outcome requirements of the course (specific academic results to be established by the course): The students should know how to plan and evaluate experiments, how to tell if the results are reproducible, how to document their results, how to communicate their research, how to write a scientific paper, a PhD thesis, when to contact a legal expert to file patents. They should know where to look for information concerning legal requirements, financial regulations, how to participate in (international) collaborations, how to form

consortia, where to find scientific courses, calls for scientific proposals, how and when to use AI.

Topics:

Data mining
Big data – structured and unstructured big data
Extract data from websites, applications, spreadsheets, IT infrastructure, emails and more
Interpret diverse file naming conversions
Check data for completeness and accuracy
Transform unstructured data automatically into easily digestible reports, tables, or files
Move data and files securely to different locations and users with file transfer automation

AI
Artificial intelligence in medical diagnosis
Artificial Intelligence in Medical Epidemiology
AI in medical (pharmaceutical) research and discovery
Informed, strategic decision making
Natural Language Processing
Machine learning
Deep structured or „hierarchical" learning

Meta analysis
Purpose of the research
Working plan, hypothesis
Sample collection, data base
Analysis, validation
Comparison with reference data
Results, publication

Science in the 21st century
Civilisation, religion, empirical science
Ancient science, medieval science, development of experimental sciences
Industrial revolution, modern science, trends in the 20th and 21st century
Forms and rules of scientific communication
Scientific literature, databases, impact, citations

Scientific career
Phases of the scientific career
Requirements of success in different phases
World science, collaborations, networks
Your proposals, your project, your own team
Know your skills and talents!
Different paths after PhD

Challenges in the 21st century
Irreproducible research: mistakes, fabrications, plagiarism
Plagiarism-detecting software, corrections, retractions

Digital age: OCRID, scientist with a number, contribution to a publication Open access: price, importance, advantages and complications, publication of negative results Open access journals, predator journals Electronic notebooks, patents or blockchain? Death of IF
Supporting methods to achieve learning outcomes: Convincing lectures
Evaluation of the acquisition of expected learning outcomes: Evaluation well be in accordance with the purposes and requirements of the course: written exam at the end of the lectures.
Mandatory reading list: none
Recommended reading list: none

Course description
Informing students on course requirements

From September 2025

Program: **Ph.D. day- training for SH students and self-cost students**

Course: **Biostatistics lecture**

Course code: **AOKDI-BAS-03**

Academic year/Semester: *2025/26 1st semester*

Educator and contact details (e-mail):

Tibor Nyári PhD (kurzusfelelős), nyari.tibor@med.u-szeged.hu

Krisztina Boda PhD, boda.krisztina@med.u-szeged.hu

Tamás Lantos PhD, lantos.tamas@med.u-szeged.hu

Ferenc Rarosi PhD, rarosi.ferenc@med.u-szeged.hu

Szűcs Mónika szucs.monika@med.u-szeged.hu

Type of course: **lecture**/seminar/practice/laboratory

Weekly hours of the course: **2**

Credit value of the course: **6**

Type of examination**: final exam at the end of semester**

Preliminary requirements (preliminary academic performance or completed course required to fulfill the purposes and requirements of the course):

Purpose of the course:

The aim of this course is to familiarize students with the most commonly used statistical methods in the clinical and research fields of medicine, enabling them to apply these methods. Students will also learn to correctly interpret statistical results from statistical software or medical articles.

Throughout the course, students will learn the concepts of data and databases. They will be able to formulate hypotheses specific to a given experimental design, create the necessary database, determine the types of variables within the database, and describe their distribution.

Students will become familiar with the methods of hypothesis testing commonly used in medical research and with the fundamentals of statistical modeling. They will learn how to select appropriate statistical methods to test hypotheses, run statistical analyzes using statistical programs, and draw appropriate statistical and medical conclusions based on the results, interpreting them according to industry standards. In addition, they will learn when it is necessary to involve a statistician in the research process.

Topics:

1. **Introduction. Data description.**

   Types of data, display of data. Sample characteristics. Categorical and continuous variables, absolute and relative frequency, bar chart, pie chart, histogram; mean, median, mode, range, quartiles, variance, standard deviation, mean-error chart, box diagram). Population, sample.

2. **Basics of Probability Theory I.**

   The concept of probability, rules of probability calculus. Odds, odds ratio. Definition of a categorical variable, the distribution, expected value, and variance of a categorical variable. Special discrete distributions: the binomial and Poisson distributions.

3. **Basics of Probability Theory II.**

   Conditional probability, diagnostic tests. The distribution of continuous variables, the density function. The normal distribution. Standardization, the binomial test as an application of standardization.

4. **Statistical estimation.**

The central limit theorem; the standard error of the mean. The concept of a confidence interval. Confidence interval for the odds ratio. Confidence interval for the population mean. The t-distribution, the use of Student's t-table. Hypothesis tests: one sample t-test, binomial test.

5. **Statistical inference, t-tests**

   One sample, paired, and independent samples t-test. Comparison of variances (F-test). One- and two-tailed tests.

6. **Correlation-regression analysis.**

   Single and multiple linear regression. Linear regression on transformed data.

7. **The chi-square test for independence**

   Assumptions, Fisher exact test

8. **Statistical errors**

   Type I and II errors, statistical power. The basics of sample size calculation

9. **Analysis of variance**

   Principle of one-way ANOVA, F-test, pairwise comparisons. Repeated measurements ANOVA.

10. **Nonparametric methods based on ranks**

    Wilcoxon-test, Mann-Whitney test, Kruskal-Wallis test

11. **2x2 tables in epidemiology**

    Cohen-Kappa, relative risk, odds ratio, logistic regression.

12. **Survival analysis**

    Life-table, Kaplan-Meier method

13. **Multivariate methods**

    Factor analysis, cluster analysis, discriminant analysis. The aim and most important properties.

Supporting methods to achieve learning outcomes:

Teaching methods:

In addition to giving theoretical background, we give practical examples based on medical and biological research papers to show the application of the methods in practice.

Requirements:

The final grade is determined on the total score, where the total score is the sum of the points obtained in practice and the final exam.

The grades are awarded as follows on the total score:

0 - 101.99 points: Fail (1)
102 - 125.99 points: Pass (2)
126 – 151.99 points: Average (3)
152 – 175.99 points: Good (4)
176 - : Excellent (5)

Exam Test

Exams are held in the classrooms of the Small Educational Building in the form of a CooSpace test. The tests cover the entire semester's practical and theoretical material, with a special focus on the use of statistical software. auxiliary materials are not allowed during the exam.

To register for the exam, students must register through the Neptun system, and registration will automatically close 24 hours before the exam begins.

The duration of the exam test is 40 minutes, and a maximum of 100 points can be earned.

Mandatory reading list:

Students can download course material (handouts, lecture notes) from Coospace. Making notes at lectures will help in preparing for the exam.

Recommended reading list:

- Michael J. Campbell – David Machin – Stephen J. Walters: Medical Statistics. A Textbook for the Health Sciences (2012) ISBN: 978-1-118-30061-9
- Internet resources:
  Khan Academy: https://www.khanacademy.org/math/statistics-probability
  Crash Course (Statistics): https://www.youtube.com/playlist?list=PL8dPuuaLjXtNM_Y-bUAhblSAdWRnmBUcr
  Rice Virtual Lab in Statistics: http://onlinestatbook.com/rvls.html
- Reiczigel Jenő – Harnos Andrea – Solymosi Norbert: Biostatisztika nem statisztikusoknak (2014). Pars Kft. ISBN: 978-963-06-3736-7 (In Hungarian)
- E-learning (in Hungarian): http://eta.bibl.u-szeged.hu/view/creators/Sz==0171cs=3AM=F3nika=3A=3A.html

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Course description
Informing students on course requirements

From September 2025

Program: **PhD day- training for SH students and self-cost students**

Course**: Biostatistic practice**

Course code: **AOKDI-BAS-04**

Academic year/Semester: **2025/26 1st semester**

Educator and contact details (e-mail):

Szűcs Mónika szucs.monika@med.u-szeged.hu

Type of course: **practice**

Weekly hours of the course: **2**

Credit vale of the course: **2**

Type of examination: **three-level acceptance**

Preliminary requirements (preliminary academic performance or completed course required to fulfill the purposes and requirements of the course): not

Purpose of course:

The aim of this course is to familiarize students with the most commonly used statistical methods in the clinical and research fields of medicine, enabling them to apply these methods. Students will also learn to correctly interpret statistical results from statistical software or medical articles.

Throughout the course, students will learn the concepts of data and databases. They will be able to formulate hypotheses specific to a given experimental design, create the necessary database, determine the types of variables within the database, and describe their distribution.

Students will become familiar with the methods of hypothesis testing commonly used in medical research and with the fundamentals of statistical modeling. They will learn how to select appropriate statistical methods to test hypotheses, run statistical analyzes using statistical programs, and draw appropriate statistical and medical conclusions based on the results, interpreting them according to industry standards. In addition, they will learn when it is necessary to involve a statistician in the research process.

Outcome requirements of the course (specific academic results to be established by the course):

Topics:

1. **Introduction. Data description.**

   Types of data, display of data. Sample characteristics. Categorical and continuous variables, absolute and relative frequency, bar chart, pie chart, histogram; mean, median, mode, range, quartiles, variance, standard deviation, mean-error chart, box diagram). Population, sample.

2. **Basics of Probability Theory I.**

   The concept of probability, rules of probability calculus. Odds, odds ratio. Definition of a categorical variable, the distribution, expected value, and variance of a categorical variable. Special discrete distributions: the binomial and Poisson distributions.

3. **Basics of Probability Theory II.**

   Conditional probability, diagnostic tests. The distribution of continuous variables, the density function. The normal distribution. Standardization, the binomial test as an application of standardization.

4. **Statistical estimation.**

   The central limit theorem; the standard error of the mean. The concept of a confidence interval. Confidence interval for the odds ratio. Confidence interval for the population mean. The t-distribution, the use of Student's t-table. Hypothesis tests: one sample t-test, binomial test.

5. **Statistical inference, t-tests**

   One sample, paired, and independent samples t-test. Comparison of variances (F-test). One- and two-tailed tests.

6. **Correlation-regression analysis.**

   Single and multiple linear regression. Linear regression on transformed data.

7. **The chi-square test for independence**

   Assumptions, Fisher exact test

8. **Statistical errors**

   Type I and II errors, statistical power. The basics of sample size calculation

9. **Analysis of variance**

   Principle of one-way ANOVA, F-test, pairwise comparisons. Repeated measurements ANOVA.

10. **Nonparametric methods based on ranks**

Wilcoxon-test, Mann-Whitney test, Kruskal-Wallis test

11. **2x2 tables in epidemiology**

    Cohen-Kappa, relative risk, odds ratio, logistic regression.

12. **Survival analysis**

    Life-table, Kaplan-Meier method

13. **Multivariate methods**

    Factor analysis, cluster analysis, discriminant analysis. The aim and most important properties.

Supporting methods to achieve learning outcomes:

Teaching methods

We give practical examples based on medical and biological research papers to show the application of the methods in practice.

During the practices, the R, Rcommander programs are used.

Evaluation of the acquisition of expected learning outcomes:

Requirements:

Attendance of the practical part is obligatory. Participating in practical sessions according to the 'Study Guide of the Faculty of Medicine'. Maximum 3 absences are allowed and at least 51% completion of the course (see below). Students who arrive more than 15 minutes late will be considered absent.

Forms of testing

The students have to perform two tests that contain practical problems that have to be solved by hand calculations and by a computer program (R, Rcommander). During the tests, the use of calculators, computers (without Internet) and their own notes on a single A4 sheet is allowed.

Evaluation of the course:

The course result is evaluated by a three-grade sign. It will be calculated from the test points (maximum 100 points). For successful completion of the course, the total accomplishment must be at least 51%.

The evaluation of the practical is based on the sum of two tests.

Accomplishement, practice, %	Evaluation
0% -50,99%	Not met requirements /Failed(NOMETRE)
51%-90,99%	Met requirements /Satisfactory (METRE/P)t
91%-	Met requirements /Excellent(METRE/H)

Mandatory reading list:

Students can download course material (handouts, lecture notes, R scripts) from Coospace. Making notes at lectures will help in preparing for the exam.

Recommended reading list:

- Michael J. Campbell – David Machin – Stephen J. Walters: Medical Statistics. A Textbook for the Health Sciences (2012) ISBN: 978-1-118-30061-9
- Internet resources:
  Khan Academy: https://www.khanacademy.org/math/statistics-probability
  Crash Course (Statistics):
  https://www.youtube.com/playlist?list=PL8dPuuaLjXtNM_Y-bUAhblSAdWRnmBUcr
  Rice Virtual Lab in Statistics: http://onlinestatbook.com/rvls.html
- Reiczigel Jenő – Harnos Andrea – Solymosi Norbert: Biostatisztika nem statisztikusoknak (2014). Pars Kft. ISBN: 978-963-06-3736-7 (In Hungarian)
- E-learning (in Hungarian): http://eta.bibl.u-szeged.hu/view/creators/Sz==0171cs=3AM=F3nika=3A=3A.html

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Course description

Informing students on course requirements

From September 2025

Program: **PhD day- training for SH students and self-cost students**
Course: **Biomedical ethics**
Academic year/Semester: 2th
Educator and contact details (e-mail): **Gergely Tari Ph.D.** – assistant professor Department of Behavioral Sciences (6720 Szeged Szenháromság st. 5.) e-mail: tari.gergely.robert@med.u-szeged.hu Oguz Kelemen Ph.D. – associate professor Department of Behavioral Sciences (6720 Szeged Szenháromság st. 5.) e-mail: kelemen.oguz@med.u-szeged.hu Hedvig Kiss Ph.D. – assistant professor Department of Behavioral Sciences (6720 Szeged Szenháromság st. 5.) e-mail: kiss.hedvig@med.u-szeged.hu
Type of course: lecture/seminar/practice/laboratory
Weekly hours of the course: 2 (for 7 weeks)
Credit vale of the course: 3
Type of examination: final exam at the end of semester, practice exam, other: evaluation (5)
Preliminary requirements (preliminary academic performance or completed course required to fulfill the purposes and requirements of the course): nonne
Purpose of course:

Primary aim of the biomedical ethics course is to describe the ethical and legal regulations concerning the biomedical field. In addition, we would like to sensitize our students attitudes towards ethical dilemmas appearing in the fields of natural sciences and developing their debate culture. By learning the theory and practice of the bioethical principles we highlight the inseparably connected international rights like human dignity and self-determination. The course support to train ethically well-prepared professionals, who are able to recognize, precisely outline and in regard to their competence solve bioethical dilemmas.

Outcome requirements of the course (specific academic results to be established by the course):

Knowledge

- Know in depth the bioethical principles (Non-maleficence; Beneficence; Justice; Autonomy).
- Comprehensively knows the Hungarian and international ethical norms in relation to biomedical research involving human subjects.
- In general, knows the Hungarian and international ethical norms in relation to animal experimentation.
- Comprehensively aware of the patient rights included in the Act No. CLIV of 1997 on Health and 23/2002. (V.). regulation.

Competences

- Recognize the bioethical dilemmas concerning his profession.
- According to the principles of moral reasoning student can formulate criticism in connection with biomedicine individually.
- Student applies the ethical standards of biomedical research while planning his research.
- Applies the professional ethical norms in order to reduce harm of animals used in experimentation.
- According to his competence Student can interact with patients and human subjects involved in biomedical research. (e.g. in process of information).

Atttitudes

- Assertive while discussing the ethical dilemma.
- Endeavor to precisely and factually describe ethical dilemmas refraining from make mistakes concerning moral reasoning. (e.g.: ad hominem reasoning).
- Always respects the default value of human dignity.
- Accepts the principles of 3Rs (Replacement, Reduction, Refinement).
- Respect of human life is the foremost guiding principle.

Autonomy and responsibility

- Able to solve professional ethical dilemmas under supervision.
- Student must refer all the professional ethical problems that are beyond his competence towards his supervisor.
- In the research planning process autonomously apply the ethical norms of biomedical research.
- If eligible to participate in any stage of animal experimentation, Student meets the professional ethical expectations.
- While working alone or in team always complies with the rights and laws concerning biomedical research.

Topics:

1. Introduction to bioethics
2. Ethical aspects of biomedical research involving human participants

a. International ethical norms

i.Nuremberg Code
i.Oviedo convention on human rights and biomedicine
i.Helsinki Declaration
b. Ethical standards and laws regulating biomedical research involving human participants
i.Ethical Code (MOK)
i.Act No. CLIV of 1997 on Health
iii.23/2002. (V.9.) regulation
3. Ethical aspects of animal experimentation
a. International ethical guidelines
i.3Rs (Replacement, Reduction, Refinement)
b. Animal rights movements
i.Concepts of Tom Regan and Peter Singer
4. Reproductive ethics in regard of embryonic research
a. In vivo and In vitro research ethics
b. Ethical issues of „designer babies”
5. Main aspects of ethics of genetics
a. CRISPR-Cas9
b. Evaluation of He Jiankui’s gene surgery
6. Workshop I. – COVID-19 vaccination
7. Workshop II. – Ethical evaluation of AI

Supporting methods to achieve learning outcomes:

Teaching methods:
- Workshops
- Practicing moral arguments
- Case analysis

Evaluation of the acquisition of expected learning outcomes:

Requirements:
- Attandence regulated according to the study and examination rules
- Grade is given according to attendance and student activity (Completing MS Forms sheets are compulsory!)
- Written test for those students who have abscences

Mandatory reading list:

- Dr. Kovács József: A modern orvosi etika alapjai. Medicina, Budapest, 2006.
- Gupta R, Morain SR: Ethical allocation of future COVID-19 vaccines. Journal of Medical Ethics Published Online First: 17 December 2020. doi: 10.1136/medethics-2020-106850
- Gruen, Lori, "The Moral Status of Animals", *The Stanford Encyclopedia of Philosophy* (Fall 2017 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/fall2017/entries/moral-animal/>.
- Krimsky, S. Ten ways in which He Jiankui violated ethics. Nat Biotechnol 37, 19–20 (2019). https://doi.org/10.1038/nbt.4337

Recommended reading list:

Sinaci, M., Sorgner, S.F. (szerk.): Ethics of Emerging Biotechnologies. From Educating the Young to Engineering Posthumans. Trivent Publishing, Budapest, 2018.