

**A COURSE SYLLABUS – DOCTORAL SCHOOL
REGARDING THE QUALIFICATION CYCLE FROM 2019 TO 2023**

GENERAL INFORMATION ABOUT COURSE				
Course title		Doctoral Seminar		
Name of the unit running the course		Doctoral School at University of Rzeszów		
Type of course (<i>obligatory, optional</i>)		Obligatory		
Year and semester of studies		1-4 Year, I – VIII semester		
Discipline		Medical Sciences		
Language of Course		Polish		
Name of Course coordinator		Dr hab. N. med. Radosław Chaber, prof. UR		
Name of Course lecturer		Dr hab. N. med. Radosław Chaber, prof. UR; dr hab. Józef Cebulski, prof. UR		
Prerequisites		1. Knowledge of the basics of human anatomy, physiology and pathophysiology 2. Knowledge of the basics of physics and chemistry in accordance with the requirements of medical universities at least at the undergraduate level. 3. Implementation of subsequent stages of the research procedure, necessary to finalize third-cycle university education and defend the doctoral thesis.		
BRIEF DESCRIPTION OF COURSE				
<p>The course focuses on extended introduction to pediatric cancer and haematological disorders', scientific trends in medicine and physical techniques that can be applied to medicine, especially vibrational spectroscopy.</p> <p>The subject of the classes is related to:</p> <ul style="list-style-type: none"> - acquiring knowledge and skills related to planning and conducting scientific research, - searching for future directions of scientific research, - critical evaluation of the one's own scientific achievements and the achievements of other scientists, - principles of conducting scientific research, working with biological material, planning and improving research methodology, - the search for new diagnostic and prognostic markers for pediatric diseases, especially neoplasms by conducting retrospective research using physical techniques, in particular vibration spectroscopy. 				
COURSE LEARNING OUTCOMES AND METHODS OF EVALUATING LEARNING OUTCOMES				
Learning outcome	The description of the learning outcome defined for the course	Relation to the degree programme outcomes (symbol)	Learning Format (Lectures, classes,...)	Method of assessment of learning outcomes (e.g. test, oral exam, written exam, project,...)
Knowledge No.1	The current state of knowledge regarding oncology, the use of vibrational spectroscopy in medical sciences and the physical basis of phenomena used in spectroscopic research in medicine..	P8S-WG/1	Seminar	Preparation of presentation and paper.

No.2	Current trends of hematology and oncology research, as well as directions of development of spectroscopic techniques and other experimental physical diagnostic techniques in medicine.	P8S-WG/2	Seminar	Preparation of presentation and paper.
No.3	Methodology of scientific research – sample preparation and storage, statistical methods of data analysis.	P8S-WG/3	Seminar	Preparation of presentation.
No.4	Rules and requirements for the publication of the results of scientific research in the field of medical and physical sciences, both in open mode and paid access.	P8S-WG/4	Seminar	Preparation of paper.
No.5	The main assumptions and principles of transfer of achieved results and results to the economic and social sphere and their commercialization.	P8S-WK/3	Seminar	Preparation of grant application form.
Skills No.1	Use your knowledge of, medicine, biology, chemistry and physics to define the purpose and research hypothesis, as well as carry out independent scientific research using the necessary measurement techniques. The ability to formulate research conclusions on the basis of the obtained results.	P8S-UW/1	Seminar	Preparation of presentation and paper.
No.2	Analyse and verify the information contained in the available scientific sources in terms of its usefulness and scientific value.	P8S-UW/2	Seminar	Preparation of presentation.
No.3	Commercialize the results of scientific research.	P8S-UW/3	Seminar	Preparation of B+R grant application form.
No.4	Communicate using specialized language in the field of the etiology and diagnosis of cancer as well as spectroscopic techniques.	P8S-UK/1	Seminar	Preparation of presentation and paper.
No.5	Disseminate the results of conducted research, both in specialist journals and monographs, as well as in popular science.	P8S-UK/2	Seminar	Preparation of articles and participation in conferences.
No.6	Initiate a debate.	P8S-UK/3	Seminar	

No.7	Participate in scientific discourse including participation in scientific sessions, lectures and conferences.	P8S-UK/4	Seminar	Participation in scientific conferences.
No.8	Work independently, as well as a member or leader of a research team, also in an international environment.	P8S-UO	Seminar	Assessment of commitment to the work of the team.
No.9	Independently design and select directions for your own development, as well as support other people in this.	P8S-UU/1	Seminar	Preparation of individual research plan and grant application form.
Social competence No.1	Critical evaluation of achievements within medicine and vibrational spectroscopy.	P8S-KK/1	Seminar	Preparation of presentation.
No.2	Critically evaluate one's own contribution to the development of medicine and physical techniques in medicine.	P8S-KK/2	Seminar	Preparation of presentation.
No.3	Recognizing the importance of knowledge in solving cognitive and practical problems.	P8S-KK/3	Seminar	Preparation of presentation.
No.4	Maintaining and developing the ethos of research and creative environments, including: - conducting scientific activity in an independent manner - respecting the principle of public ownership of the results of scientific activity, taking into account the principles of intellectual property protection.	P8S-KR	Seminar	Preparation of presentation.

LEARNING FORMAT – NUMBER OF HOURS

Semester (no.)	Lectures	Seminars	Lab classes	Internships	others	ECTS
I		30				0
II		30				0
III		30				0
IV		30				0
V		30				0
VI		30				0
VII		30				0
VIII		30				0

METHODS OF INSTRUCTION

1. A PROBLEM-SOLVING SEMINAR,
2. A SEMINAR SUPPORTED BY A MULTIMEDIA PRESENTATION,

3. DISTANCE LEARNING SEMINAR,
4. TEXT ANALYSIS
5. DEBATE AND SCIENTIFIC DISCUSSION
6. PROJECT WORK- RESEARCH PROJECT AND PRESENTATION PREPARATION.

COURSE CONTENT

1. Seminars:

The doctoral seminar focuses on supporting the subsequent stages of the research procedure, the implementation of which is crucial for the preparation of the doctoral dissertation.

These stages are:

I Semester:

1. Introduction and use in practice of techniques of free speech and professional presentation of research, as well as self-presentation.
2. Techniques for disseminating the results of their own and other scientists' researches during classes with students and popularizing activities.
3. Introduction to pediatric oncology and hematology – the epidemiology, diagnostics, the most important diseases.
4. Spectroscopic methods - FTIR, Raman, EPR spectroscopy - theoretical and practical foundations.
5. Discussion and practical use of basic research methods and techniques for the implementation of the proposed research project.

II Semester:

1. Introduction to pediatric oncology and hematology – the epidemiology, diagnostics – rare neoplasms and other disorders.
2. Fundamental issues related to the preparation of individual research project and a doctoral dissertation - legal acts, formal requirements, main project assumptions.
3. Methods of obtaining research funding – available grant competitions, formal requirements. Preparation of a grant application, discussion of the main research problems, consultations.
4. Basics of oscillatory spectroscopy, absorption and nature of electromagnetic radiation and scattering on molecules. Raman effect, RDS, coherent Raman spectroscopy and coherent anti-stokes Raman Spectroscopy. Interpretation of spectra images. Fourier-Transform Infrared Spectroscopy –transmission and reflection measurements modes.

III Semester:

1. Introduction to pediatric oncology and hematology – the epidemiology, diagnostics and treatment response regarding the subject of individual research project.
2. Selection of medical sources describing the disease entity being the subject of the trial based on bibliographic data.
3. Conducting a source query of materials concerning spectroscopic techniques and cancer diagnostics.
4. Practical aspects of using available equipment and software – spectral imaging, chemical mapping, measurement conditions, analysis of biological materials, in the context of improving the techniques used in the project.
5. Specifying the title of the doctoral dissertation.
6. Methods of obtaining research funding – available grant competitions, formal requirements. Preparation of a grant application, discussion of the main research problems, consultations.

IV Semester

1. Development of individual theoretical issues in accordance with the prepared, individual research plan.
2. Development of an accurate methodology for the storage of biological material and its preparation, taking into account the requirements of the used research techniques.
3. Proposing a methodology for spectroscopic studies.
4. Performing preliminary tests of the obtained material in accordance with the proposed methodology.

V Semester

1. Assessment of the progress of work on the preparation of the doctoral dissertation. Evaluation of the obtained research results, discussion of the main research problems, planning further activities in the project.
2. Optimization of research methodology.
3. Conducting research for the purposes of the doctoral dissertation.
4. Identification of the obtained spectral spectra and assignment of the position of individual bands corresponding to their functional groups.

VI Semester

1. Assessment of the progress of work on the preparation of the doctoral dissertation. Evaluation of the obtained research results, discussion of the main research problems, planning further activities in the project.
2. Conducting research for the purposes of the doctoral dissertation.
3. Selection of methods of statistical analysis carried out for the needs of the doctoral dissertation.
4. Getting acquainted with the medical information of patients from whom the examined material was taken and a statistical confrontation of these data with analysis results.

VII Semester

1. Assessment of the progress of work on the preparation of the doctoral dissertation. Evaluation of the obtained research results, discussion of the main research problems, planning further activities in the project
2. Conducting statistical analyses and interpreting the results obtained.
3. Formulation of conclusions and forecasts.
4. Preparation of the working text of the doctoral dissertation.

VIII Semester

1. Substantive assessment of the prepared manuscript.
2. Preparation of the final version of the doctoral dissertation.

COURSE ASSESSMENT CRITERIA

I semester:

- the doctoral student is obliged to present one paper, which should be an introduction to the scientific discipline along with the definition of his research subject. Due to the interdisciplinary nature of the studies, it is advisable that the introduction should be popularizing.
- activity in classes,

Final assessment criteria: passed-failed

II semester:

- the doctoral student is obliged to present one presentation, which should be an overview of the achievements of recent years related to the subject of the dissertation, in order to improve the skills of self-presentation and presentation of the results of his/her own and other scientists.
- activity in classes.

Final assessment criteria: passed-failed

III semester:

- the doctoral student is obliged to present one presentation of proposed sample preparation and measurements techniques related to the subject of the dissertation,
- activity in classes,
- preparation of grant application form, indicated by the lecturer, without the obligation to submit.

Final assessment criteria: passed-failed

IV semester:

- the doctoral student is obliged to pre-release version of dissertation chapter/article or accepted publication of preliminary research results,
- activity in classes,
- preparation of conference presentation of obtained research result, without obligation to participate.

Final assessment criteria: passed-failed

V-VIII semester:

- assessment of the progress of work on the doctoral dissertation in accordance with the individual research plan,
- conference participation.

Final assessment criteria: passed-failed

TOTAL PhD STUDENT WORKLOAD REQUIRED TO ACHIEVE THE INTENDED LEARNING OUTCOMES – NUMBER OF HOURS AND ECTS CREDITS

Activity	Number of hours
Scheduled course contact hours	240
Other contact hours involving the teacher (consultation hours, examinations)	-
Non-contact hours – student`s own work (preparation for classes or examinations, project, etc.)	240+
Total number of hours	480+
Total number of ECTS credits	0

INSTRUCTIONAL MATERIALS

Compulsory literature:	<ol style="list-style-type: none"> 1. Red. Naukowa A. Chybicka, K.Sawicz-Birkowska. Onkologia i hematologia dziecięca tom 1-2. Wyd. Lekarskie PZWL, 2008. 2. Red. Naukowa K. Małek. Spektroskopia oscylacyjna – od teorii do praktyki. Wyd. 1. PWN, 2016. 3. Z. Kęcki. Podstawy spektroskopii molekularnej. PWN, 1998. 4. W. Szczepaniak. Metody instrumentalne w analizie chemicznej. PWN Warszawa, 2002. 5. J. Sadlej. Spektroskopia molekularna. PWN Warszawa, 2002. 6. A. Hrynkiewicz, E. Rokita. Fizyczne metody badań w biologii, medycynie i ochronie środowiska. PWN Warszawa, 1999. 7. M. Handke, C. Paluszkiwicz. Metody i techniki pomiarowe w spektroskopii oscylacyjnej, Akapit, 1998.
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Complementary literature:	<ol style="list-style-type: none"><li data-bbox="367 100 1495 168">1. J. A. Well, J. R. Bolton, J. E. Wertz. Electron paramagnetic resonance, elementary theory and practical applications. Wiley, 1994.<li data-bbox="367 190 1495 235">2. R.S. Macomberr. A complete introduction to modern NMR Spectroscopy. Wiley, 1998.<li data-bbox="367 257 1495 297">3. S.M. Blaney, L.J. Helman, P.C. Adamson. Pizzo & Poplack's Pediatric Oncology Eight Edition.
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