Course descriptions:	
Department/Code	AFC/NMRS
Title	Nuclear Magnetic Resonance Spectroscopy
Accredited / Credits	2
Time requirements – (hours/year)	Lecture 2 hours/week
Timetable	Yes
Minimum (B + C) students	Not set
Substituted course	None
Preclusive courses	None
Prerequisite courses	None
Informally recommended courses	None
Courses depending on this Course	None
Academic Year	2018/2019
Form of course completion	Colloquium
Type of completion	-
Course credit prior to examination	No
Included in study average	No
Language of instruction	English
Repeated registration	No
Semester taught	SS+WS
Optional course	Yes
Internship duration	-

Course objectives (annotation):
The objective of the course is to help the students to understand basic principles of nuclear magnetic resonance, instrumental equipment and modern one- and multi-dimensional techniques of NMR experiments. Furthermore, some applications of NMR are illustrated. Essential practical part of this course consists of interpretation of NMR spectra and consequent determination of molecular structure of basic molecules.

Course content (syllabus)
History and development of the nuclear magnetic resonance spectroscopy, theoretical background of the method

Parameters of 1D NMR spectra chemical shift, signal splitting (coupling constant), integral intensity
Studied nuclei, description of FT NMR spectrometer and sample, measuring procedure
Methodology of NMR experiment, pulse sequences, FID, data processing
Spectra analysis - interpretation of 1H and 13C NMR spectra and elucidation of molecular structure (practical examples)
Selected 1D NMR techniques relaxation, dynamic effects, multiple resonance and decoupling, Nuclear Overhauser Effect, spectral editing spin echo, polarization transfer, inverse detection, pulsed field gradients
Basics of 2D NMR spectroscopy homonuclear and heteronuclear 2D experiments (COSY, TOCSY, HETCORE, HMQC, HSQC, HMBC)
Spectroscopy of other common nuclei
Solid-state NMR spectroscopy and MRI

Requirements on students

Bachelor degree in Chemistry (or related field of study).

Guarantors and lecturers

Guarantors: doc. RNDr. Michal Čajan, Ph.D.
Lecturer: doc. RNDr. Michal Čajan, Ph.D., RNDr. Bohuslav Drahoš, Ph.D.

Literature

Basic: Lambert, J. B., Mazzola, E. P. *Nuclear Magnetic Resonance Spectroscopy. An Introduction to Principles, Applications, and Experimental Methods*. Pearson Education, New Jersey, USA, 2004.
Basic: S. Braun, H. O. Kalinowski, S Berger. *150 and more basic NMR experiments: a practical course*. Wiley VCH, Weinheim, Germany, 1998.
Recommended: Friebolin, H. (2005). *Basic One- and Two-Dimensional NMR Spectroscopy*. Wiley VCH, Weinheim, Germany.
Recommended: Duer, M. J. (2010). *Introduction to Solid-State NMR Spectroscopy*.
Recommended: Mitchell, T. N.; Costisella, B. *NMR - From Spectra to Structures - An Experimental Approach*.
Recommended: Breitmaier, E. (2002). *Structure Elucidation by NMR in Organic Chemistry: A Practical guide*. John Wiley & Sons, Chichester, England.

Study programmes

Materiálová chemie 1407T007

Analytická chemie 1403T001

Competences acquired

Recall basic conceptions and laws of NMR spectroscopy.
Describe functions of NMR spectrometer and application in chemistry.

Teaching methods
Lecture Dialogic Lecture (Discussion, Dialog, Brainstorming) Work with Text (with Book, Textbook)

Assessment methods
Dialog

Course descriptions:	
Department/Code	KBC/BCHIE
Title	Information in Biochemistry
Accredited / Credits	2
Time requirements – (hours/year)	2h seminar/week, 13weeks/semester; total 26 h/year
Timetable	Yes
Minimum (B + C) students	Not set
Substituted course	None
Preclusive courses	None
Prerequisite courses	None
Informally recommended courses	None
Courses depending on this Course	None
Academic Year	2018/2019
Form of course completion	Colloquium
Type of completion	Written test and oral colloquium
Course credit prior to examination	No
Included in study average	Yes
Language of instruction	English
Repeated registration	No
Semester taught	SS
Optional course	No
Internship duration	-

Course objectives (annotation):
To provide students with practical skills, essential for their following studies of Biochemistry subject, related to chemical and biochemical literature and databases searching, data recording, analysis and presentation, and application of collection, analysis and presentation of scientific information and results.

Course content (syllabus)
1. Introduction to information in Science – information storage, retrieval and exchange in human and science history and present.

2. Primary information sources – scientific articles (original and review articles, structure and content of articles – introduction, methods, results, discussion, cited references, authors and affiliations, submission, article DOI. Peer review and editorial processes.
3. Scientific journals - relevant journals in Science and Biochemistry. Journal content, formatting, on-line availability - abstracts and full text. Journal publishers and web portals, CrossRef service.
4. Information databases – full-text and citation databases. Searching using keywords, author's name, structures search. Web of Science and Science Citation Index, SCOPUS, PubMed. Chemical databases - Beilstein Abstracts. Biochemical databases – NCBI portal, Genbank, BRENDA, EXPASY. On-line resources and electronic library of Palacký University.
5. Other information sources - edited books and monographs, book series – Methods in Enzymology, encyclopaedia, chemical tables - Merck Index. Patent databases. Product information from companies – "white papers", safety sheets.
6. Scientific meetings - oral and poster presentation, plenary lectures and conference section, book of abstracts, satellite symposia.
7. Social networks– specific uses of social networking in science information exchange – Facebook, Twitter, Instagram. Scientific networks – LinkedIn, ResearchGate, Academia. Document sharing services.
8. Information access and costs – paid subscription system and open access, publication costs and funding, preprint servers, predatory journals and conferences.
9. Basics of scientometrics and bibliometrics – journal indexing, impact of articles, journal and institutions, citation analysis, h-index, ORCID identifier
10. Personal information storage and citing – local and cloud depositories, bibliographic software (EndNote and EndNote Web, OBD Pro), citation tools in text processing.

Requirements on students
100% participation rate in classes Successful completion of three home works Successful completion of final written test and oral colloquium

Guarantors and lecturers
Doc. Mgr. Marek Petřivalský, Dr.

Literature
Bawden D., Robinson L.: Introduction to Information Science, Neal-Schuman Publishers, 1st edition 2012, ISBN-13: 978-1555708610 Fabián O.: Elektronické informační zdroje, 2012, ebook https://web2.mlp.cz/koweb/00/04/23/37/07/elektronicke-informacni-zdroje.pdf Vymětal J.: Informační zdroje v odborné literature. Wolters Kluwer ČR (Aspi), Praha 2010. ISBN: 978-80-7357-520-5 Electronic Information Resources (EIR) of Palacky University in Olomouc, web page http://ezdroje.upol.cz/index.php?lang=en

Study programmes
Biochemie 1406T002
Analytická chemie 1403T001
Materiálová chemie 1403T007

Competences acquired
After completing the course, students are able to (1) use online resources to find information and literature relevant to a given scientific topic, (2) demonstrate ability to systematically collect and record information and results (3) prepare texts based on literature search or analysis results, and present them orally.

Teaching methods
Monologic Lecture(interpretation, training) Dialogic Lecture (discussion, dialog, brainstorming) Work with Text (with printed and on-line book) 1. Theoretical instruction: sources of chemical, biochemical and medicinal information – journals, indexing services, databases, results management – software for data. Presenting results – preparation of reports, posters, presentation. 2. Practical skills trained during subject classes: literature search using online services, creating personal archive. Familiarization with scientific and biochemical databases. Familiarization with software for information organization and results analysis. 3. Practical skills trained by independent home work

Assessment methods
Colloquium – combined written test and oral discussion of the subject

Course descriptions:	
Department/Code	KFC/COME
Title	Scientific Communication
Accredited / Credits	1
Time requirements – (hours/year)	1h seminar/week
Timetable	Yes
Minimum (B + C) students	Not set
Substituted course	None
Preclusive courses	None
Prerequisite courses	None
Informally recommended courses	None
Courses depending on this Course	None
Academic Year	2018/2019
Form of course completion	Pre-exam credit
Type of completion	-
Course credit prior to examination	Yes
Included in study average	Yes
Language of instruction	English
Repeated registration	No
Semester taught	WS
Optional course	No
Internship duration	-

Course objectives (annotation):
Introduction of students into the presentation of scientific results.

Course content (syllabus)
1. Scientific Communication - Forms of communication. Writing. A scientific article-publication. 2. Graphics. Quoting. From a manuscript to the publication. Oral (verbal) communication. Organisation principles at scientific and technical communication. 3. Oral presentation-lecture. Presentation techniques. Phonetic means. Audience and its activisation. 4. Preparing the lecture. Plan of the presentation. Presentation itself. Common mistakes at lecturing. Meeting and discussion leading.

5. Poster. Discussion at poster section. Referee on a scientific work. Nonverbal communication
6. -12. Short presentations-short report and discussion.
13. Principles of elaboration at diploma thesis (title, contents, structure, chapters, experimental data, results, charts, formulas, quotations, summary), technical implementation (printing and binding the manuscript).

Requirements on students
1) active participation at 80% of the seminars 2) elaboration of an oral presentation and poster

Guarantors and lecturers
Guarantors: prof. RNDr. Radek Zbořil, Ph.D., **Seminar lecturer:** doc. RNDr. Karel Berka, Ph.D., Sergii Kalytchuk, Ph.D., Datta Kasibhatta Kumara Ramanatha, Ph.D., Jason Perman, Ph.D., Juri Ugolotti, Ph.D., Yu Wang, Ph.D., Dr. Giorgio Zoppellaro

Literature
Recommended: Hubáček J. Jak mluvit a přednášet. Profil, Ostrava, 1983. Recommended: Mandel S. Jak úspěšně vystupovat. Linde, Praha, 1993. Recommended: Dohalská M., Hůrková-Novotná J., Pařízek V., Špalek V, Vymětal, J. Mluvím, mluvíš, mluvíme. Horizont, Praha, 1985. Recommended: Thiel E. Mluvíme tělem. Knižní klub, Praha, 1997. Recommended: Šalda J. Od rukopisu ke knize a časopisu. SNTL, Praha, 1983. Recommended: Vymětal E., Váchová M. Úvod do studia odborné literatury. Orac, Praha, 2000. Recommended: Vymětal J. a kol. Úvod do studia odborné literatury v chemii. Orac, Praha, 2001.

Study programmes
Biochemie 1406T002
Analytická chemie 1403T001
Materiálová chemie 1403T007

Time Requirements	
Activities (Attendance, etc.)	**Time requirements for activity [h]**
Attendance	30
Preparation for the exam	30

Competences acquired
Organize scientific communication, prepare a poster, and an oral presentation

Teaching methods
Demonstration

Assessment methods
Analysis of linguistic and nonverbal presentation

Course descriptions:	
Department/Code	KBC/BTCEN
Title	Biotechnology
Accredited / Credits	3
Time requirements – (hours/year)	2 h lecture/week, 12 weeks/semester; total 24h/year
Timetable	Yes
Minimum (B + C) students	None
Substituted course	None
Preclusive courses	None
Prerequisite courses	None
Informally recommended courses	None
Courses depending on this Course	None
Academic Year	2018/2019
Form of course completion	Examination
Type of completion	Written test
Course credit prior to examination	No
Included in study average	Yes
Language of instruction	English
Repeated registration	No
Semester taught	SS
Optional course	No
Internship duration	-

Course objectives (annotation):
To provide students with an overview of concepts, methods and processes used in classical and modern biotechnologies in production of food, chemical compounds, biomolecules and pharmaceuticals.

Course content (syllabus)
1. Introduction to classical and modern biotechnology - historical perspective, development and biotechnology applications **2. Classical biotechnology I** - fermentation biotechnology in production of alcoholic beverages and

bioethanol

3. Classical biotechnology II - fermentation biotechnology in production of biomass, lactic and meat products.

4. Classical biotechnology III – microbial production of chemical compounds (organic acids, aminoacids, vitamins)

5. Classical biotechnology III – microbial production of polymers (proteins and enzymes, polysaccharides)

6. Modern biotechnologies - theoretical principles and methods. Techniques of DNA manipulation, PCR and recombinant DNA, gene transfer and cell fusion, gene editing. Cell and tissues cultures.

7. Plant biotechnology - genetic manipulation of plants, hybrid and transgenic plants, manipulation of plant nutritional value, plant with increased resistance to pathogens and herbicides. Biopharming for production of chemical compounds, polymers and pharmaceutical products

8. Environmental biotechnology – biofuel, biogas and biomass production, communal waste management, biodegradation and bioremediation

9. Basic technology principles – bioreactors, biotransformation and immobilized enzymes and cells, biofilms

10. Economy, ethical and legal aspects of biotechnologies. Bioethics. Security and health hazards, public attitudes. Legislation and regulations controlling the research and the use of biotechnology in the Czech Republic and EU

Requirements on students
Successful completion of written test
Activities linked with the course (e-learning, etc.)
None

Guarantors and lecturers
Guarantor and lectures – Marek Petřivalský

Literature
Johnson-Green P.:. Introduction to Food Biotechnology, CRC Press 2002, ISBN 0-8493-1152-7 Rittmann B.E., McCarthy P.L.:. Environmental Biotechnology: Principles and Applications, McGraw-Hill Higher Education 2001, ISBN 0-07-118184-9 Slater A., Scott N., Fowler M.:. Plant Biotechnology, Oxford University press 2003, ISBN 0-19-925468-0 Smith J.E. (ed.). Biotechnology, 3rd Edition, Cambridge University Press 1998, ISBN 0-521-44911-1

Study programmes
Molekulární a buněčná biologie 1515R004
Biotechnologie a genové inženýrství 1406R012

Experimentální biologie rostlin 1501T029
Materiálová chemie 1407T007
Analytická chemie 1403T001

Time Requirements	
Activities (Attendance, etc.)	**Time requirements for activity [h]**
Attendance	48
Preparation for the exam	50

Competences acquired
After completing the course, students are able to understand main biotechnology concepts, describe main approaches in biotechnology, and recall biotechnological processes used in classical and modern biotechnology.

Teaching methods
Monologic Lecture(Interpretation, Training) Dialogic Lecture (Discussion, Dialog, Brainstorming)

Assessment methods
Examination by written test