LEARNING OUTCOMES FOR
INTEGRAL UNDERGRADUATE AND GRADUATE STUDY OF PHYSICS;
PROGRAMME: MASTER OF SCIENCE IN PHYSICS

Upon completing the degree, students will be able to:

1. KNOWLEDGE AND UNDERSTANDING

1.1. formulate, discuss and explain the basic laws of physics including mechanics, electromagnetism and thermodynamics
1.2. demonstrate a thorough knowledge of advanced methods of theoretical physics including classical mechanics, classical electrodynamics, statistical physics and quantum physics
1.3. demonstrate a thorough knowledge of the most important physics theories (logical and mathematical structure, experimental support, described physical phenomena)
1.4. describe the state of the art in - at least- one of the presently active physics specialities

2. APPLYING KNOWLEDGE AND UNDERSTANDING

2.1. identify the essentials of a process/situation and set up a working model of the same or recognize and use the existing models
2.2. evaluate clearly the orders of magnitude in situations which are physically different, but show analogies, thus allowing the use of known solutions in new problems;
2.3. apply standard methods of mathematical physics, in particular mathematical analysis and linear algebra and corresponding numerical methods
2.4. adapt available models to new experimental data
2.5. perform numerical calculation independently, even when a small personal computer or a large computer is needed, including the development of simple software programs
2.6. perform experiments independently using standard techniques, as well as to describe, analyse and critically evaluate experimental data

3. MAKING JUDGEMENTS

3.1. work with a high degree of autonomy, even accepting responsibilities in project planning and in the managing of structures
3.2. develop a personal sense of responsibility, given the free choice of elective/optional courses
3.3. comprehend the ethical characteristics of research and of the professional activity in physics

4. COMMUNICATION SKILLS

4.1. work in an interdisciplinary team
4.2. present one’s own research or literature search results to professional as well as to lay audiences
4.3. develop the written and oral English language communication skills that are essential for pursuing a career in physics

5. LEARNING SKILLS

5.1. search for and use physical and other technical literature, as well as any other sources of information relevant to research work and technical project development (good knowledge of technical English is required)
5.2. remain informed of new developments and methods and provide professional advice on their possible range and applications
5.3. carry out research by undertaking a PhD
5.4. participate in projects which require advanced skills in modelling, analysis, numerical calculations and use of technologies

LEARNING OUTCOMES FOR INTEGRAL UNDERGRADUATE AND GRADUATE STUDY OF PHYSICS; PROGRAMME: MASTER OF EDUCATION IN PHYSICS

Upon completing the degree, students will be able to:

1. KNOWLEDGE AND UNDERSTANDING

1.1. demonstrate a thorough knowledge and understanding of the fundamental laws of classical and modern physics
1.2. demonstrate a thorough knowledge and understanding of the most important physics theories (logical and mathematical structure, experimental support, described physical phenomena)
1.3. demonstrate knowledge and understanding of basic experimental methods, instruments and methods of experimental data processing in physics
1.4. demonstrate knowledge and understanding of new insights into contemporary physics teaching methods and strategies;
1.5. describe the framework of natural sciences;
1.6. integrate physics content knowledge with knowledge of pedagogy, psychology, didactics and teaching methods courses;

2. APPLYING KNOWLEDGE AND UNDERSTANDING

2.1. identify and describe important aspects of a particular physical phenomenon or problem;
2.2. recognize and follow the logic of arguments, evaluate the adequacy of arguments and construct well supported arguments;
2.3. use mathematical methods to solve standard physics problems;
2.4. prepare and perform classroom physics experiments and interpret the results of observation;
2.5. use information and communication technology efficiently (to foster active enquiry, collaboration and interaction in the classroom);
2.6. create a learning environment that encourages active engagement in learning and promotes continuing development of pupils' skills and knowledge;
2.7. plan and design appropriate teaching lessons and learning activities based on curriculum goals and principles of interactive enquiry-based teaching;

2.8. plan and design efficient and appropriate assessment strategies and methods to evaluate and ensure the continuous development of pupils;

3. **MAKING JUDGMENTS**

3.1. develop a critical scientific attitude towards research in general, and in particular by learning to critically evaluate arguments, assumptions, abstract concepts and data;
3.2. develop clear and measurable learning outcomes and objectives in teaching based on curriculum goals;
3.3. reflect on and evaluate their own practice of teaching;
3.4. accept responsibilities in planning and managing teaching duties;
3.5. demonstrate professional integrity and ethical behaviour in work with pupils and colleagues;

4. **COMMUNICATION SKILLS**

4.1. communicate effectively with pupils and colleagues;
4.2. present complex ideas clearly and concisely;
4.3. present their own research results at education or scientific meetings;
4.4. use the written and oral English language communication skills that are essential for pursuing a career in physics and education;

5. **LEARNING SKILLS**

5.1. search for and use professional literature as well as any other sources of relevant information;
5.2. remain informed of new developments and methods in physics and education;
5.3. develop a personal sense of responsibility for their professional advancement and development.

LEARNING OUTCOMES FOR INTEGRAL UNDERGRADUATE AND GRADUATE STUDY OF PHYSICS; PROGRAMME: MASTER OF EDUCATION IN PHYSICS AND COMPUTER SCIENCE

Upon completing the degree, students will be able to:

1. KNOWLEDGE AND UNDERSTANDING

1.1. demonstrate a thorough knowledge and understanding of the fundamental laws of classical and modern physics
1.2. demonstrate a thorough knowledge and understanding of the most important physics theories (logical and mathematical structure, experimental support, described physical phenomena)

1.3. demonstrate knowledge and understanding of basic experimental methods, instruments and methods of experimental data processing in physics
1.4. list and describe basic concepts and abstract principles of computing machines, information and communication technology;
1.5. describe the purpose and use of common software packages;
1.6. list and describe the methods for manipulating data, basic principles of databases and fundamental algorithms in programming;
1.7. describe the latest developments in digital technology and their possible application in teaching;
1.8. demonstrate knowledge and understanding of new insights into contemporary physics and informatics teaching methods and strategies;
1.9. describe the framework of natural sciences;
1.10. integrate physics and informatics content knowledge with knowledge of pedagogy, psychology, didactics and teaching methods courses;

2. APPLYING KNOWLEDGE AND UNDERSTANDING

2.1. identify and describe important aspects of a particular physical phenomenon or problem;
2.2. recognize and follow the logic of arguments, evaluate the adequacy of arguments and construct well supported arguments;
2.3. use mathematical methods to solve standard physics problems;
2.4. prepare and perform classroom physics experiments and interpret the results of observation;
2.5. describe the basic concepts of digital technology;
2.6. apply fundamental algorithms in programming;
2.7. use computing technology to solve scientific and technological problems
2.8. prepare pupils for lifelong learning in digital environment;
2.9. create a learning environment that encourages active engagement in learning and promotes continuing development of pupils' skills and knowledge;
2.10. plan and design appropriate teaching lessons and learning activities based on curriculum goals and principles of interactive enquiry-based teaching;
2.11. plan and design efficient and appropriate assessment strategies and methods to evaluate and ensure the continuous development of pupils;

3. MAKING JUDGMENTS

3.1. develop a critical scientific attitude towards research in general, and in particular by learning to critically evaluate arguments, assumptions, abstract concepts and data;
3.2. develop clear and measurable learning outcomes and objectives in teaching based on curriculum goals;
3.3. reflect on and evaluate their own practice of teaching;
3.4. accept responsibilities in planning and managing teaching duties;
3.5. demonstrate professional integrity and ethical behaviour in work with pupils and colleagues;

4. COMMUNICATION SKILLS

4.1. communicate effectively with pupils and colleagues;
4.2. present complex ideas clearly and concisely;
4.3. present their own research results at education or scientific meetings;
4.4. use the written and oral English language communication skills that are essential for pursuing a career in physics, informatics and education;

5. LEARNING SKILLS

5.1. search for and use professional literature as well as any other sources of relevant information;
5.2. remain informed of new developments and methods in physics, informatics and education;
5.3. develop a personal sense of responsibility for their professional advancement and development.

LEARNING OUTCOMES FOR INTEGRAL UNDERGRADUATE AND GRADUATE STUDY OF PHYSICS; PROGRAMME: MASTER OF EDUCATION IN PHYSICS AND TECHNOLOGY

Upon completing the degree, students will be able to:

1. KNOWLEDGE AND UNDERSTANDING

1.1. demonstrate a thorough knowledge and understanding of the fundamental laws of classical and modern physics
1.2. demonstrate a thorough knowledge and understanding of the most important physics theories (logical and mathematical structure, experimental support, described physical phenomena)
1.3. demonstrate a thorough knowledge and understanding of basic concepts in techniques;
1.4. demonstrate a thorough knowledge and understanding of basic concepts in information and communication technology;
1.5. demonstrate knowledge and understanding of basic experimental methods, instruments and methods of experimental data processing in physics
1.6. demonstrate knowledge and understanding of new insights into contemporary physics, informatics and technology teaching methods and strategies;
1.7. describe the framework of natural sciences;
1.8. integrate physics, informatics and technology content knowledge with knowledge of pedagogy, psychology, didactics and teaching methods courses;

2. APPLYING KNOWLEDGE AND UNDERSTANDING

2.1. identify and describe important aspects of a particular physical phenomenon or problem;
2.2. identify and describe important aspects of techniques and their applications;
2.3. recognize and follow the logic of arguments, evaluate the adequacy of arguments and construct well supported arguments;

2.4. use mathematical methods to solve standard physics problems;
2.5. prepare and perform classroom physics experiments and interpret the results of observation;
2.6. use information and communication technology efficiently (to foster active enquiry, collaboration and interaction in the classroom);
2.7. prepare and perform classroom practical's (practical work)
2.8. create a learning environment that encourages active engagement in learning and promotes continuing development of pupils' skills and knowledge;
2.9. plan and design appropriate teaching lessons and learning activities based on curriculum goals and principles of interactive enquiry-based teaching;
2.10. plan and design efficient and appropriate assessment strategies and methods to evaluate and ensure the continuous development of pupils;

3. MAKING JUDGMENTS

3.1. develop a critical scientific attitude towards research in general, and in particular by learning to critically evaluate arguments, assumptions, abstract concepts and data;
3.2. develop clear and measurable learning outcomes and objectives in teaching based on curriculum goals;
3.3. reflect on and evaluate their own practice of teaching;
3.4. accept responsibilities in planning and managing teaching duties;
3.5. demonstrate professional integrity and ethical behaviour in work with pupils and colleagues;

4. COMMUNICATION SKILLS

4.1. communicate effectively with pupils and colleagues;
4.2. present complex ideas clearly and concisely;
4.3. present their own research results at education or scientific meetings;
4.4. use the written and oral English language communication skills that are essential for pursuing a career in physics and education;

5. LEARNING SKILLS

5.1. search for and use professional literature as well as any other sources of relevant information;
5.2. remain informed of new developments and methods in physics, informatics, technology and education;
5.3. develop a personal sense of responsibility for their professional advancement and development

LEARNING OUTCOMES FOR
INTEGRAL UNDERGRADUATE AND GRADUATE STUDY OF PHYSICS;
PROGRAMME: MASTER OF EDUCTION IN PHYSICS AND CHEMISTRY

Upon completing the degree, students will be able to:

1. KNOWLEDGE AND UNDERSTANDING

1.1. demonstrate a thorough knowledge and understanding of the fundamental laws of classical and modern physics;
1.2. demonstrate a thorough knowledge and understanding of the fundamental concepts in chemistry;
1.3. demonstrate a thorough knowledge and understanding of the most important physics theories (logical and mathematical structure, experimental support, described physical phenomena);
1.4. demonstrate a thorough knowledge and understanding of the most important chemistry laws and theories;
1.5. demonstrate knowledge and understanding of basic experimental methods, instruments and methods of experimental data processing in physics and chemistry;
1.6. demonstrate knowledge and understanding of new insights into contemporary physics and chemistry teaching methods and strategies;
1.7. describe the framework of natural sciences;
1.8. integrate physics and chemistry content knowledge with knowledge of pedagogy, psychology, didactics and teaching methods courses;

2. APPLYING KNOWLEDGE AND UNDERSTANDING

2.1. identify and describe important aspects of a particular physical phenomenon or problem;
2.2. describe important aspects of chemical change;
2.3. apply stoichiometry;
2.4. recognize and follow the logic of arguments, evaluate the adequacy of arguments and construct well supported arguments;
2.5. use mathematical methods to solve standard physics problems;
2.6. prepare and perform classroom physics and chemistry experiments and interpret the results of observation;
2.7. apply basic laboratory safety and security measures;
2.8. teach science contextually, i.e., provide examples from everyday life when teaching abstract concepts;
2.9. use information and communication technology efficiently (to foster active enquiry, collaboration and interaction in the classroom);
2.10. create a learning environment that encourages active engagement in learning and promotes continuing development of pupils' skills and knowledge;
2.11. plan and design appropriate teaching lessons and learning activities based on curriculum goals and principles of interactive enquiry-based teaching;
2.12. plan and design efficient and appropriate assessment strategies and methods to evaluate and ensure the continuous development of pupils;

3. MAKING JUDGMENTS

3.1. develop a critical scientific attitude towards research in general, and in particular by learning to critically evaluate arguments, assumptions, abstract concepts and data;

3.2. develop clear and measurable learning outcomes and objectives in teaching based on curriculum goals;
3.3. reflect on and evaluate their own practice of teaching;
3.4. accept responsibilities in planning and managing teaching duties;
3.5. demonstrate professional integrity and ethical behaviour in work with pupils and colleagues;

4. COMMUNICATION SKILLS

4.1. communicate effectively with pupils and colleagues;
4.2. present complex ideas clearly and concisely;
4.3. present their own research results at education or scientific meetings;
4.4. use the written and oral English language communication skills that are essential for pursuing a career in physics, chemistry and education;

5. LEARNING SKILLS

5.1. search for and use professional literature as well as any other sources of relevant information;
5.2. remain informed of new developments and methods in physics, chemistry and education;
5.3. develop a personal sense of responsibility for their professional advancement and development.