SECTION A: DEFINITIVE

Items in this section may be reviewed and developed within Schools as part of the Annual Program Monitoring Process and in line with the Guidelines to Modifications to Programs and Courses.

1.	**General course information**		
1.1	School: SST	1.6	Credits (ECTS): 8
1.2	Course Title: Physics II for Scientists and Engineers	1.7	Course Code: PHYS 162
1.3	Pre-requisites: PHYS161	1.8	Effective from: 2019 *(year)*
1.4	Co-requisites: None		
1.5	Physics ☒ Core ☐ Elective Programs: *(in which the course is offered)*		

2. Course description (max.150 words)

This is an introductory calculus-based course covering Electricity, Magnetism and elements of Optics. The students will learn to identify fundamental laws in everyday electromagnetic phenomena and to apply these laws to solving basic physics problems and to describing laboratory experiments.

3.	**Summative assessment methods** (tick if applicable)**:**				
3.1	Examination	☒	3.5	Presentation	☐
3.2	Term paper	☐	3.6	Peer-assessment	☐
3.3	Project	☐	3.7	Essay	☐
3.4	Laboratory Practicum	☒	3.8	Other *(specify)*	_____

4. Course aims

Physics is a natural science concerned with the fundamental principles of the universe, matter, energy and their interaction. It forms the foundation for other physical sciences, engineering, medicine and industry, and it has led to great advances in our fundamental understanding of the physical world. This understanding, in turn, has translated into countless engineering applications and technologies that benefit us in our daily lives. Physics can be divided into classical physics (classical mechanics, waves, thermodynamics, electricity, magnetism and optics) and modern physics (quantum mechanics, relativity, molecular and solid-state physics, nuclear and high energy physics and other advanced topics). The current course PHYS 162 will cover electricity, magnetism, and optics.

This course is meant to 1) foster scientific creativity through variety of engaging lectures/discussions coupled with 2) improving problem-solving skills with exercises involving analytical and conceptual physics problems as well as encouraging and 3) developing team-based collaborative skills physics laboratory experiments by introducing the fundamental principles, methods and engineering applications of electromagnetism and optics. This course is designed for freshman students who have good preparation in physics and mathematics and who will pursue research and development careers in various areas of physical science and engineering. In addition,

this course 4) provides practical knowledge they will need to complete intermediate and advanced undergraduate physics courses.

5. Course learning outcomes (CLOs)

5.1 By the end of the course the student will be expected to be able to:

1) Think critically and scientifically by applying physics concepts, including from other classes.
2) The student will gain knowledge and develop the skills to understand, set-up and solve qualitatively physics problems for the basic topics.
3) The student will learn the appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in topics listed above.
4) The student will improve his/her communicating skills related to this course via the reading the textbook and additional materials, doing homework problems, writing laboratory reports and doing optional in-class presentation.
5) The student will collect and analyze data and/or information from external sources.
6) The student will prepare coherent reports based on the accepted standards presented in class.
7) The student will meet the deadlines developing effective learning habits and discipline necessary to promote life-long learning.

5.2

CLO ref #	Program Learning Outcome(s) to which CLO is linked	Graduate Attribute(s) to which CLO is linked
1-2	1, 2	Possess an in-depth and sophisticated understanding of their domain of study;
3	2, 3, 5, 6	Intellectually agile, curious, creative, and open-minded;
1, 4	4, 6	Fluent and nuanced communicators across languages and cultures;
5-7	4, 7	

SECTION B: NON-DEFINITIVE
Course Syllabus Template

Details of teaching, learning and assessment

Items in this Section should be considered annually (or each time a course is delivered) and amended as appropriate, in conjunction with the Annual Program Monitoring Process. The template can be adapted by Schools to meet the necessary accreditation requirements.

6.	**Detailed course information**		
6.1	Academic Year: 2019	6.3	Schedule (class days, time): MWF 9:00-9:50, 10:00-10:50, 12:00-12:50, 15:00-15:50, 16:00-16:50
6.2	Semester: Spring	6.4	Location (building, room): 7e.329

7. Course leader and teaching staff

Position	Name	Office #	Contact information	Office hours/or by appointment
Course Leader	**N/A**	**N/A**	**N/A**	**N/A**
Course Instructor(s)	**Ernazar Abdikamalov**	**7e.336**	**ernazar.abdikamalov@nu.edu.kz**	**Tue 14:00-17:00 Thu 14:00-17:00**
	Dana Alina	**7e.332**	**dana.alina@nu.edu.kz**	**Mon 14:00-16:00 Wed 14:00-16:00**
	Anton Desyatnikov	**7e.335**	**anton.desyatnikov@nu.edu.kz**	**Mon 11:00-13:00 Wed 10:00-13:00**
	Alexander Tikhonov	**7e.537**	**atikhonov@nu.edu.kz**	**Mon 15:00-18:00**
Teaching Assistant(s)	**N/A**			

8. Course Outline

Session	Date (tentative)	Topics and Assignments	Course Aims (ref. # only, see item 4)	CLOs
Lecture	Week 1-6	Electricity	1, 2, 4	1-4
	Week 7-11	Magnetism, Waves	1, 2, 4	1-4
	Week 12-14	Optics	1, 2, 4	1-4

9. Learning and Teaching Methods (briefly describe the approaches to teaching and learning to be employed in the course)

1	**Standard Lecture Based Approach**
2	**Standard Recitation Based Approach**
3	**In-class exercises and in-recitation exercises; social engagement.**
4	**Standard Homework Based Approach**
5	**Guest Lectures/Online Media/Hybrid Flipped Classroom**

10. Summative Assessments

#	Activity	Date (tentative)	Weighting (%)	CLOs
1	Homework	Weekly	0%	1-4, 7
2	Midterm I	Week 4	20%	1-4
3	Midterm II	Week 8	20%	1-4

4	Final	Registrar	40%	1-3
5	Labs	Weekly	20%	5, 6, 7

11. Grading

Letter Grade	Percent range	**Grade description** (where applicable)

12. Learning resources (use a full citation and where the texts/materials can be accessed)

E-resources, including, but not limited to: databases, animations, simulations, professional blogs, websites, other e-reference materials (e.g. video, audio, digests)	arxiv.org library resources Google scholar All science journals (see Scopus database) and conference proceedings
E-textbooks	1) University Physics, Volume 2, Ling et al., ISBN 13: 9781938168161, Publisher: OpenStax, https://open.umn.edu/opentextbooks/textbooks/university-physics-volume-2 2) University Physics, Volume 3, Ling et al, ISBN 13: 9781938168185, Publisher: OpenStax, https://open.umn.edu/opentextbooks/textbooks/university-physics-volume-3
Laboratory physical resources	Available in the Lab syllabus.
Special software programs	N/A
Journals (inc. e-journals)	N/A
Text books	1) John W. Jewett and Raymond A. Serway "*Physics for Scientists and Engineers*" Volume 2, 8th edition (international edition), 2010, ISBN-13 978-1-4390-4874-0, ISBN-10 1-4390-4874-6 2) University Physics, Volume 2, Ling et al., ISBN 13: 9781938168161, Publisher: OpenStax, https://open.umn.edu/opentextbooks/textbooks/university-physics-volume-2 3) University Physics, Volume 3, Ling et al, ISBN 13: 9781938168185, Publisher: OpenStax, https://open.umn.edu/opentextbooks/textbooks/university-physics-volume-3 Other recommended text: 1. D. Randall Knight "*Physics for scientists and engineers: a strategic approach with Modern Physics*", 3rd edition, Pearson Education Limited, 2014, ISBN 978-1-292-02078-5 2. 2. Jearl Walker "*Principles of physics*", 9th ed., Extended ed., John Wiley & Sons, Inc., 2011, ISBN 978-0-470-56158-4

13. Course expectations

Attendance policy
Students are expected to attend all of lectures, recitation, and all of labs. Failure to do so without valid excuse will result in the automatic grade of F for the course. Attendance of all lectures and recitations is

required as any information provided only during the lecture and recitation may be used a part of any examination. A limited extra grade may be awarded to student with good participation.

Lecture Notes
Students are encouraged to take lecture notes as the information provided in the lectures is intended to clarify, explain and supplement the textbook, not to be a copy of it. Note that any new information that is provided during the lecture but is not in the textbook can be used on any exam or quiz.

Office Hours Policy
All students are encouraged to visit instructor office hours. In case help is needed outside of these hours: first attempt to to understand the problem by yourself (spend sufficient time - attempt derivations & consult with the text & other references, including recommended texts & open-access, ask peers). If a problem still remains, students are encouraged to ask a TA a well-considered detailed question. In case further assistance is required, an email with the detailed question should be laid out with precisely the trouble that is occurring as the first step towards setting up an additional appointment. We will respond rapidly with either the solution or explanation or we will set up an appointment to facilitate learning the particular technique involved.

Class participation
Students are encouraged to participate in class/lab discussions. Limited bonus points may be awarded to a few students for active participation in the class activities (e.g. asking relevant questions during the class and answering instructor questions).

Classroom decorum
No food or drinks are allowed in the classroom and labs. All the electronic devices (such as laptops, cell phones, etc) should be turned off during lecture and labs, unless otherwise instructed.

Missed exams
No exam or quiz make-ups are allowed under any circumstances. In the case of a missed exam, it may be adequate for a score to be calculated to determine the requisite grade at fair discretion; a documented excuse will need to be presented for this route. Note that all medical notes should be signed by NU doctor; notes from outside clinics will not be accepted.

Late assignments
10% from the assignment grade will be subtracted for every late consecutive day pass the deadline, unless a valid, documental excuse is provided.

Electronic resources
You are expected to regularly check your Nazarbayev University email for updates and announcements about the course. You are also required to use Moodle as determined by the instructor.

Safety regulations
Safe in-class behavior should be exercised.

14.	**Academic Integrity Statement**

You are welcome and encouraged to get assistance on your presentation from your fellow students, professors and other sources. However, the work you present should be your own and reflect your own understanding of the subject. All material from outside sources should be properly referenced. Anyone intentionally violating these guidelines will fail the course and will be charged with academic dishonesty

15.	**E-Learning**

and subject to NU's disciplinary procedures described in Student Code of Conduct and Disciplinary Procedures (approved by the AC on 05.02.2014), specifically, paragraphs 13-16 (plagiarism and cheating).		
n/a		
16. Approval and review		
Date of Approval: 5/12/2018	**Minutes #:**	**Committee: E. Abdikamalov, T. Oikonomou**
Date(s) of Approved Change:	**Minutes #:**	**Committee:**