

**PLAN I PROGRAM NASTAVE / COURSE SYLLABUS**Naziv predmeta: **ARHITEKTONSKA FIZIKA**Course title: **BUILDING PHYSICS**

Šifra predmeta / Course code	Status predmeta / Course type	Semestar / Semester	ECTS kredita / ECTS credits	Fond časova / Number of classes
<b>4.1.</b>	<b>obavezan / required</b>	<b>IV</b>	<b>4.0</b>	<b>2P+1V+1L</b>

**Studijski program:**ARHITEKTURA. Akademске studije  
Dužina trajanja: 10 semestara i 300 kredita.**Study programme:**ARCHITECTURE. Academic studies  
Duration: 10 semesters and 300 credits.**Uslovljenost drugim predmetima:**

Položeni ispiti iz: Arhitektonske konstrukcije I, II i III.

**Prerequisites:**

Passed exams: Architectural Structures I, II and III.

**Ciljevi izučavanja predmeta:**

Analiza osnovnih parametara fizike zgrada: toplotna zaštita, zvučna zaštita i dnevni osvjetljaj. Oblasti izučavanja: elementi klimatologije; koncept, principi projektovanja i osnovi proračuna toplotne i zvučne izolacije; koncept, principi primjene i vrednovanja dnevnog osvjetljaja. Evropska i nacionalna regulativa: direktive, standardi, pravilnici.

**Course aims:**

Analysis of the basic parameters of building physics: thermal protection, heat protection and daily illumination. The field of study: climatology elements; concepts, design principles and the basis of calculation of thermal and sound insulation; concepts, principles, implementation and evaluation of daily illumination. European and national legislation: Directives, Standards, Regulations.

**Predmetni nastavnik – saradnici u nastavi /  
Lecturer – teaching assistants**

Prof. dr Dušan Vuksanović

AF \_ 2 saradnika

**Metode nastave i savladavanje gradiva:**

Predavanja, vježbe, konsultacije. Semestralni rad.

**Teaching methods and learning activities:**

Lectures, tutorial and consultations. Semester work.

**SADRŽAJ PREDMETA:**

Pripremna nedjelja	Priprema i upis semestra.
I nedjelja	Ishodišta i razvoj arh. fizike: zahtjevi klime unutrašnjeg prostora, energetski aspekti komfora, klimatologija
II nedjelja	Toplotna zaštita: toplotni komfor, kontrola toplotnih gubitaka i dobitaka u zgradi, principi i domen primjene: omotač zgrade
III nedjelja	Analiza toplotne zaštite elemenata omotača: karakteristični parametri, pravilnici i standardi
IV nedjelja	Toplotna zaštita - toplotna izolacija: proračun koeficijenta prolaza toplote "k (U)", toplotni mostovi
V nedjelja	Toplot. zaštita - difuzija vodene pare: proračun pritisaka vodene pare, dijagram difuzije, problemi kondenzacije
VI nedjelja	Toplotna zaštita - proračun faktora toplotne stabilnosti za ljetnje razdoblje
VII nedjelja	KOLOKVIJUM I
VIII nedjelja	Zvučna zaštita i akustika: zvučni komfor, analiza zvučne zaštite elemenata omotača: karakteristični parametri, pravilnici i standardi

**SUBJECT CONTENT:**

Preliminary week	Preparation and enrollment of semester.
1 <sup>st</sup> week	The origin and Development of Arch. physics: the requirements of the interior climate, energy aspects of comfort, climatology
2 <sup>nd</sup> week	Thermal protection: thermal comfort, control of the heat loss and gain in the building, principles and application domain: the building envelope
3 <sup>rd</sup> week	Analysis of the thermal protection elements for envelope: characteristic parameters, Regulations and Standards
4 <sup>th</sup> week	Thermal protection - thermal insulation: calculation of heat transfer coefficient "k (U)," thermal bridges
5 <sup>th</sup> week	Heat. Protection - water vapor diffusion: the budget pressures of water vapor, the diagram of diffusion, condensation problems
6 <sup>th</sup> week	Thermal protection - calculation of thermal stability factor for the summer period
7 <sup>th</sup> week	1 <sup>st</sup> TEST (colloquium)
8 <sup>th</sup> week	Acoustic insulation and acoustics: acoustic comfort, analysis of acoustic insulation for envelope elements: characteristic parameters, rules and standards

IX nedjelja	Zvučna zaštita - proračun zvučne izolacije za vazdušni zvuk i zvuk udara, principi materijalizacije
X nedjelja	Osvjetljenje u arhitekturi - dnevni osvjetljaj i vještačko osvjetljenje: svjetlosni komfor, pojmovi i parametri, metode proračuna
XI nedjelja	Arhitektonski aspekti kvaliteta dnevnog osvjetljaja, vještačko osvjetljenje: principi, kriterijumi i parametri
XII nedjelja	Zvučna zaštita i akustika: zvučni komfor, analiza zvučne zaštite elemenata omotača: karakteristični parametri, pravilnici i standardi
XIII nedjelja	Zvučna zaštita - proračun zvučne izolacije za vazdušni zvuk i zvuk udara, principi materijalizacije
XIV nedjelja	KOLOKVIJUM II
XV nedjelja	Završni ispit.
XVI nedjelja	Ovjera semestra i upis ocjena.
XVII nedjelja	Dopunska nastava i popravni ispitni rok.
XVIII-XXI nedjelja	

9 <sup>th</sup> week	Acoustic insulation - calculation of sound insulation for air and impact sound, principles of materialization
10 <sup>th</sup> week	Lighting in Architecture - daily illumination and artificial lighting: lighting comfort, terms and parameters, calculation methods
11 <sup>th</sup> week	Architectural aspects of the quality of daily illumination, artificial lighting: the principles, criteria and parameters
12 <sup>th</sup> week	Acoustic insulation and acoustics: acoustic comfort, the analysis of sound insulation envelope elements: characteristic parameters, Regulations and Standards
13 <sup>th</sup> week	Acoustic insulation - calculation of sound insulation for air and impact sound, principles of materialization
14 <sup>th</sup> week	2 <sup>nd</sup> TEST (colloquium)
15 <sup>th</sup> week	FINAL EXAM.
16 <sup>th</sup> week	Verification of the semester and mark enrollment.
17 <sup>th</sup> week	Additional lessons and exam term.
18 <sup>th</sup> -21 <sup>st</sup> week	

### Opterećenje studenata:

<b><u>Nedjeljno</u></b>
<b>4.0 kredita x 40/30 = 5 sati i 33 minuta</b>
<b>Struktura:</b> 2 sata predavanja 1 sat računskih vježbi 1 sat laboratorijskih vježbanja 1 sat i 33 minuta samostalnog rada, uključujući konsultacije
<b><u>U toku semestra</u></b>
<b>Nastava i završni ispit:</b> (5 sati i 33 min) x 16 = <b>88 sati i 48 min</b> <b>Neophodne pripreme</b> prije početka semestra (administracija, upis, ovjera) 2 x (5 sati i 33 minuta) = <b>11 sati i 6 minuta</b>
<b>Ukupno opterećenje za predmet</b> 4.0x30 = <b>120 sati</b>
<b>Dopunski rad:</b> 20 sati i 6 minuta <b>Struktura opterećenja:</b> 88 sati i 48 min. (Nastava) + 11 sati i 6 min. (Priprema) + 20 sati i 6 min. (Dopunski rad) = 120 sati

### Student workload:

<b><u>Weekly</u></b>
<b>4.0 credits x 40/30 = 5 hours and 33 minutes</b>
<b>Structure:</b> 2 hours of lectures 1 hours of tutorial 1 hour of laboratory 1 hours and 33 minutes of individual work, including consultations
<b><u>During the semester</u></b>
<b>Teaching and the final exam:</b> (5 hours and 33 min) x 16 = <b>88 hours and 48 minutes</b> <b>Necessary preparations</b> before the start of the semester (administration, registration, certification) 2 x (5 hours and 48min) = <b>11 hours and 6 minutes</b>
<b>Total hours for the course:</b> 4.0x30 = <b>120 hours</b> <b>Additional hours:</b> 20 hours and 6 minutes <b>Structure of workload:</b> 88 hours and 48 min (lectures) + 11 hours and 6 min (preparation) + 20 hours and 6 min (Additional hours) = 120 hours

### Literatura / Literature:

<ul style="list-style-type: none"> <li>- Popović-Jovanović M.: "Zdravo stanovanje", Arhitektonika, Arhitektonski fakultet Univerziteta u Beogradu, Beograd, 1991.</li> <li>- Standardi za oblast Toplotna tehnika u građevinarstvu: JUS U.J5.: 600, 510, 520, 530</li> <li>- Pucar M., Pajević M., Jovanović Popović M.: "Bioklimatsko planiranje i projektovanje – urbanistički parametri", Zavet, Beograd, 1994.</li> <li>- Zbašnik Senegačnik M.: "Pasivna kuća", SUN ARH doo, Zagreb, 2009.</li> <li>- Neufert E.: "Arhitektonsko projektovanje", Građevinska knjiga, Beograd, 1996.</li> </ul>
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### Oblici provjere znanja i ocjenjivanje:

<p>* Uredno pohađanje nastave : ukupno 10 poena (svaki izostanak manje 1 poen), maksimalno 3 izostanka</p> <ul style="list-style-type: none"> <li>- I kolokvijum : maksimum 15 poena</li> <li>- II kolokvijum : maksimum 15 poena</li> <li>- 4 x Seminarski rad : maksimum 40 poena</li> <li>- Završni ispit : maksimum 20 poena</li> </ul> <p>** Prelazna ocjena se dobija ako student ostvari najmanje 51 poen.</p> <p>- Ocjene: A (91-100); B (81-90); C (71-80); D (61-70); E (51-60); F (manje od 51 poen).</p>
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### Forms of Assessment:

<p>* Regular attendance of classes: 10 points (each one less cause failure point), maximum 3 absences</p> <ul style="list-style-type: none"> <li>- First test: maximum 15 points</li> <li>- Second test: maximum 15 points</li> <li>- 4 X Seminar work: maximum 40 points</li> <li>- Final exam: maximum 20 points</li> </ul> <p>** Passing grade is obtained if the student achieved at least 51 points.</p> <p>- Rating: A (91-100) B (81-90) C (71-80) D (61-70) E (51-60), F (below 51 points).</p>
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### Očekivani ishodi učenja:

<p>Očekuje se da student, nakon položenog Arhitektonska fizika:</p> <ol style="list-style-type: none"> <li>1. Pozna je i koristi principe projektovanja optimalnih vizuelnih, termalnih i akustičnih ambijenata, a prema principima održivog razvoja;</li> <li>2. Ima sposobnost da sintezno koristi znanje iz konstruktivne i</li> </ol>
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### Expected learning outcomes:

<p>It is expected that the student after passing the architectural physics:</p> <ol style="list-style-type: none"> <li>1. Knows and uses the principles of designing optimal visual, thermal and acoustic environments, and according to the principles of sustainable development;</li> </ol>
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građevinske tematike, kao i poznavanje aktuelnih tehnologija, u procesu projektovanja;  
3. Posjeduje adekvatno znanje o fizičkim osobinama i karakteristikama građevinskih materijala, komponenata i sistema, kao i uticajima izbora istih na životnu sredinu.

**Metode za ocjenu kvaliteta i obezbjeđivanje željenih rezultata učenja:**

Kontrola od strane Univerziteta, kontrola nastavnog procesa od strane Fakulteta, spisak prisustva studenata, analize stepena prolaznosti (sistem upravljanja kvalitetom u skladu sa ISO 9001).

**Napomena:**

Dodatne informacije o predmetu mogu se dobiti kod predmetnog nastavnika, šefa studijskog programa i kod prodekana za nastavu.

2. Has the ability to synthetically uses the knowledge of the constructive and special topics, as well as knowledge of current technology in the design process;  
3. Has adequate knowledge of the physical properties and characteristics of building materials, components and systems, as well as the influence of the same choices on the environment.

**Methods for assessing the quality and ensuring preferred learning outcomes:**

Control by the University, the control of the teaching process by the faculty, the list of presence of students, analysis of the degree of transience (quality management system in accordance with ISO 9001).

**Admonishment:**

Further information about the subject can be obtained from the course teacher, Head of the study programme and Vice Dean for Education.