**Universitatea Politehnica din Bucuresti**

**Facultatea de Inginerie in Limbi Straine**

**Departamentul de Inginerie in Limbi Straine**

**ANUNT**

**FISE DE DISCIPLINA**

**POSTURI DIDACTICE VACANTE**

**scoase la concurs în semestrul II, 2021 - 2022**

**PE PERIOADĂ NEDETERMINATĂ**

**Facultatea de inginerie IN LIMBI STRAINE**

***Departamentul de Inginerie in Limbi Straine***

**Semestrul 2 2021 - 2022**

**Sef de lucrari, poziţia 22,** disciplinele: Programming Languges, Bioinformatics, Bioinformatique

***Domeniul ştiinţific***: Calculatoare si tehnologia informatiei

**Annex no. 2**

**SUBJECT DESCRIPTION**

1. **Information about the program**

|  |  |
| --- | --- |
| * 1. Higher education institution
 | University POLITEHNICA of Bucharest |
| 1.2 Faculty | Faculty of Engineering in Foreign Languages |
| 1.3 Department | Department of Engineering in Foreign Languages |
| 1.4 Field of study | Mechanical engineering |
| 1.5 Study cycle | Undergraduate (license/bachelor) |
| 1.6 Program / Qualification | Mechanical engineering (in English)/ Engineer |

1. **Data about the subject**

|  |  |
| --- | --- |
| 2.1 Name of subject | Programming Languages ( Limbaje de programare) |
| 2.2 Course holder |  |
| 2.3 Seminar holder |  |
| 2.4 Laboratory/project holder |  |
| 2.5 Year of study | 1 | 2.6 Semester | 2 | 2.7 Evaluation type | E | 2.8 Subject type | DF/DO |

1. **Estimated time (hours per semester) of didactic activities**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **3.1 Number of hours per week** | 3 | course hours | 1 | seminar |  | laboratory | 2 |
| **3.2. Number of hours per semester** | 42 | course hours | 14 | seminar |  | laboratory | 28 |
| **3.3.Distribution of spend time:** |  |  |
| Study of textbooks, bibliography and course notes | 14 | h |
| Supplementary study in library, on electronic platforms, on the fieldwork | 4 |  |
| Preparation of seminars/laboratories, home assignments, papers, portfolios, essays | 14 | h |
| Tutoring |  |  |
| Examinations  | 4 | h |
| Other activities  |  |  |
| **3.4 Total hours of individual study** | **36** |  |
| **3.5 Total hours per semester [[1]](#footnote-1)** | **78** |  |
| **3.6 Number of credits** | **3** |  |

1. **Preconditions (where relevant)**

|  |  |
| --- | --- |
| 4.1 curriculum- related |  |
| 4.2 competence - related |  |

1. **Facilities and equipment (where relevant)**

|  |  |
| --- | --- |
| 5.1 for the course | * Projector, white or black board
 |
| 5.2 for the course seminar |  |
| 5.3 for the laboratory/project | * Laboratory with computers preinstalled with Matlab or Matlab clones
 |

1. **Specific competences acquired**

|  |  |
| --- | --- |
| Professional competences | * Operating with the fundamental knowledge in mathematics, engineering and computer science.
* Design of hardware, software and communications components.
* Solving problems using the tools of computer science and engineering.
* Improving the performance of hardware, software and communications systems.
* Design and integrate systems using technologies and programming environments.
 |
| Transversal competences | * Honorable, responsible, ethical and within the law conduct, to guarantee the reputation of the profession.
* Identification, description and implementation of project management processes by taking different roles in the team and by description of the results in clear and concise verbal and written form, in a foreign language.
* Demonstrating the spirit of initiative and action to update the professional, economic and organizational culture knowledge.
 |

1. **Course objectives (as resulting from the grid of specific competences)**

|  |  |
| --- | --- |
| 7.1 Subject general goal | * Introduction to programming using Matlab
 |
| 7.2 Specific objectives | * Introduction to Matlab
* Describing the programming paradigms, focusing on problem solving using programming
 |

1. **Content**

|  |  |  |
| --- | --- | --- |
| **8.1 Course** | **Teaching methods** | **Observations** |
| 1. Introduction. Computers. Programs. Computer solving problems, Algorithms. | Blackboard, projector, moodle. |  |
| 2. Matlab Introduction, Command line, Getting Help, Matlab Script and Function Files, I/O Functions |  |
| 3., 4. Flow Control |  |
| 5. Strings, Set Operations, Data Representation, File I/O Functions |  |
| 6. Functions, Recurrent Functions, GUIs in MATLAB |  |
| 7. Problem solving. Max/Min, Sorting, Exhaustive Search. |  |
| **Bibliography*** MathWorks Documentation, 2021a version, https://www.mathworks.com/help/releases/R2021a/index.html
* MATLAB® Programming for Engineers, 6th edition, Stephen J. Chapman, Cengage, 2020
* Essential MATLAB for Engineers and Scientists 7th Edition, Daniel T. Valentine, Brian Hahn, Academic Press, 2019
* MATLAB: A Practical Introduction to Programming and Problem Solving, 5th edition, Stormy Attaway Butterworth-Heinemann, 2018
* MATLAB for Engineers, 5th edition, Holly Moore , Pearson; 2017
 |
| **8.2 Seminar**  | **Teaching methods** | **Observations** |
| **8.3 Laboratory**  | Moodle, individual work at computer |  |
| 1. Matlab Introduction, Command line, Getting Help, Matlab Script and Function Files, I/O Functions |  |
| 2-4. Flow Control |  |
| 5. Strings, Set Operations,  |  |
| 6. Data Representation, File I/O Functions |  |
| 7. Functions |  |
| 8. Recurrent Functions |  |
| 9. GUIs in MATLAB |  |
| 10. Max/Min, Sorting |  |
| 11. Search |  |
| 12.-13. Practical problems |  |
| 14. Laboratory test |  |
| **Bibliography*** MathWorks Documentation, 2021a version, https://www.mathworks.com/help/releases/R2021a/index.html
* MATLAB® Programming for Engineers, 6th edition, Stephen J. Chapman, Cengage, 2020
* Essential MATLAB for Engineers and Scientists 7th Edition, Daniel T. Valentine, Brian Hahn, Academic Press, 2019
* MATLAB: A Practical Introduction to Programming and Problem Solving, 5th edition, Stormy Attaway Butterworth-Heinemann, 2018
* MATLAB for Engineers, 5th edition, Holly Moore , Pearson; 2017
 |

1. **Subject’s relevance to the epistemic community, professional associations and representative employers in fields significant for the program**

|  |
| --- |
| * The course aims to offer the student a structured method to solve engineering problems using the computer. It is not designed for the computer whiz, but for the regular freshman who enters in his first year of faculty, with or without computer science background, and is damned to use thereafter the computer for his whole life.
 |

1. **Assessment**

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Weight in final grade |
| 10.4 Course | Knowing the theory | Written examination | 40 |
| Solving a coding task |
| 10.5 Seminar |  |  |  |
|  |  |  |
| 10.6 Laboratory/Project | Attendance + homework + activity | Oral examination | 30 |
| Laboratory coding test | Practical test during the lab | 30 |
| 10.7 Minimal standard of performance |
| 50 points |

|  |  |  |
| --- | --- | --- |
| **Filling in date** | **Signature of the course holder** | **Signature of the applications holder(s)** |

|  |  |
| --- | --- |
| **Date of endorsement in the department** | **Signature of the Department Director** |
|  | Prof. Dr. Ing. George DRAGOI |

**Anexa nr. 2**

**FIŞA DISCIPLINEI**

1. **Date despre program**

|  |  |
| --- | --- |
| * 1. Instituţia de învăţământ superior
 | Universitatea POLITEHNICA din Bucureşti |
| 1.2 Facultatea  | Facultatea de Inginerie în Limbi Străine |
| 1.3 Departamentul | Departamentul de Inginerie în Limbi Străine |
| 1.4 Domeniul de studii | Inginerie Mecanică |
| 1.5 Ciclul de studii | Licenţă |
| 1.6 Programul de studii / Calificarea | Inginerie mecanică (în limba engleză) /Inginer |

1. **Date despre disciplină**

|  |  |
| --- | --- |
| 2.1 Denumire disciplina | Programming Languages ( Limbaje de programare) |
| 2.2 Titular activităţi de curs |  |
| 2.3 Titular activităţi de seminar |  |
| 2.4 Titular activităţi de laborator/lucrari |  |
| 2.5 Anul de studiu | 1 | 2.6 Semestrul | 2 | 2.7 Tipul de evaluare | E | 2.8 Regimul disciplinei | DF/DO |

1. **Timpul total estimat (ore pe semestru) al activităţilor didactice**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **3.1 Număr de ore pe săptămână** | 3 | din care ore curs | 1 |  seminar |  | laborator | 2 |
| **3.2. Numar ore pe semestru** | 42 | din care ore curs | 14 |  seminar |  | laborator | 28 |
| **3.3.Distribuţia fondului de timp:** |  |  |
| Studiul după manual, suport de curs, bibliografie şi notiţe | 14 | ore |
| Documentare suplimentară în bibliotecă, pe platformele electronice de specialitate / pe teren | 4 |  |
| Pregătire seminarii / laboratoare, teme, referate, portofolii şi eseuri | 14 | ore |
| Tutoriat  |  |  |
| Examinări  | 4 | ore |
| Alte activităţi  |  |  |
| **3.4 Total ore studiu individual** | **36** |  |
| **3.5 Total ore pe semestru [[2]](#footnote-2)** | **78** |  |
| **3.6 Numărul de credite** | **3** |  |

1. **Precondiţii (acolo unde este cazul)**

|  |  |
| --- | --- |
| 4.1 de curriculum |  |
| 4.2 de competenţe |  |

1. **Condiţii (acolo unde este cazul)**

|  |  |
| --- | --- |
| 5.1 de desfăşurare a cursului | * Sala dotata cu proiector si tablă
 |
| 5.2 de desfăşurare a seminarului |  |
| 5.3 de desfăşurare a laboratorului | * Sala de laborator dotata cu calculatoare pe care s-a instalalat Matlab sau o clonă a acestuia
 |

1. **Competenţele specifice acumulate**

|  |  |
| --- | --- |
| Competenţe profesionale | * Operarea cu fundamentele matematice, inginereşti şi ale informaticii.
* Proiectarea componentelor hardware, software şi de comunicaţii.
* Soluţionarea problemelor folosind instrumentele ştiinţei şi ingineriei calculatoarelor.
* Îmbunătăţirea performanţelor sistemelor hardware, software şi de comunicaţii.
* Proiectarea şi integrarea sistemelor informatice utilizând tehnologii şi medii de programare.
 |
| Competenţe transversale | * Comportarea onorabilă, responsabilă, etică, în spiritul legii pentru a asigura reputaţia profesiei.
* Identificarea, descrierea şi derularea proceselor din managementul proiectelor, cu preluarea diferitelor roluri în echipă şi descrierea clară şi concisă, verbal şi în scris, într-o limbă de circulaţie internaţională, a rezultatelor din domeniul de activitate.
* Demonstrarea spiritului de iniţiativă şi acţiune pentru actualizarea cunoştinţelor profesionale, economice şi de cultură organizaţională.
 |

1. **Obiectivele disciplinei (reieşind din grila competenţelor specifice acumulate)**

|  |  |
| --- | --- |
| 7.1 Obiectivul general al disciplinei | * Introducerea in programare folosind Matlab
 |
| 7.2 Obiectivele specifice | * Introducere în Matlab
* Descrierea paradigmelor de programare cu accent pe rezolvarea problemelor folosind programarea calculatorului.
 |

1. **Conţinuturi**

|  |  |  |
| --- | --- | --- |
| **8.1 Curs** | **Metode de predare** | **Observaţii** |
| 1. Introducere. Calculatoare. Programe. Rezolvarea problemelor folosind calculatorul. Algoritmi. | Tabla, proiector, Moodle |  |
| 2. Introducere Matlab, Linie de comandă, Obținere ajutor, Scripturi Matlab și fișiere funcții. Funcții I/O |  |
| 3., 4. Controlul fluxului la progamare |  |
| 5. Șiruri de caractere, Operații pe mulțimi, Reprezentarea datelor, Funcții I/O pentru fișiere |  |
| 6. Funcții, Funcții recurente, GUI-uri în MATLAB |  |
| 7. Rezolvarea problemelor. Max/Min, Sortare, Căutare exhaustivă. |  |
| **Bibliografie*** MathWorks Documentation, 2021a version, https://www.mathworks.com/help/releases/R2021a/index.html
* MATLAB® Programming for Engineers, 6th edition, Stephen J. Chapman, Cengage, 2020
* Essential MATLAB for Engineers and Scientists 7th Edition, Daniel T. Valentine, Brian Hahn, Academic Press, 2019
* MATLAB: A Practical Introduction to Programming and Problem Solving, 5th edition, Stormy Attaway Butterworth-Heinemann, 2018
* MATLAB for Engineers, 5th edition, Holly Moore , Pearson; 2017
 |
| **8.2 Seminar**  | **Metode de predare** | **Observaţii** |
| **8.3 Laborator**  | Moodle, lucru individual la calculator |  |
| 1. Introducere Matlab, Linie de comandă, Obținere ajutor, Script Matlab și fișiere de funcție, Funcții I/O |  |
| 2-4. Controlul fluxului de programare |  |
| 5. Șiruri, operații de pe mulțimi |  |
| 6. Reprezentarea datelor, funcții I/O pe fișiere |  |
| 7. Funcții |  |
| 8. Funcții recurente |  |
| 9. Interfețe în MATLAB |  |
| 10. Max/Min, Sortare |  |
| 11. Căutare |  |
| 12.-13. Probleme practice |  |
| 14. Test de laborator |  |
| **Bibliografie*** MathWorks Documentation, 2021a version, https://www.mathworks.com/help/releases/R2021a/index.html
* MATLAB® Programming for Engineers, 6th edition, Stephen J. Chapman, Cengage, 2020
* Essential MATLAB for Engineers and Scientists 7th Edition, Daniel T. Valentine, Brian Hahn, Academic Press, 2019
* MATLAB: A Practical Introduction to Programming and Problem Solving, 5th edition, Stormy Attaway Butterworth-Heinemann, 2018

MATLAB for Engineers, 5th edition, Holly Moore , Pearson; 2017 |

1. **Colaborarea conţinuturilor disciplinei cu aşteptările reprezentanţilor comunităţii epistemice, asociaţiilor profesionale şi angajatori reprezentativi din domeniul aferent programului**

|  |
| --- |
| * Cursul își propune să ofere studentului o metodă structurată de rezolvare a problemelor de inginerie folosind computerul. Nu este conceput pentru genii ale programării, ci pentru bobocul obișnuit care intră în primul an de facultate, cu sau fără studii în informatică, și va fi obligat să folosească computerul pentru a rezolva probleme pentru toată viața.
 |

1. **Evaluare**

|  |  |  |  |
| --- | --- | --- | --- |
| Tip activitate | 10.1 Criterii de evaluare | 10.2 Metode de evaluare | 10.3 Pondere din nota finală |
| 10.4 Curs | Cunoasterea teoriei | Examen scris | 40 |
| Rezolvarea unei sarcini de programare |
| 10.5 Seminar |  |  |  |
|  |  |  |
| 10.6 Laborator/lucrari | Prezenta + teme + activitate | Oral | 30 |
| Test programare | Test pratic in timpul laboratorului | 30 |
| 10.7 Standard minim de performanţă |
| 50 puncte |

|  |  |  |
| --- | --- | --- |
| **Data completării** | **Semnătura titularului de curs** | **Semnătura titularului/ titularilor de aplicaţii** |

|  |  |
| --- | --- |
| **Data avizării în departament** | **Semnătura directorului de Departament** |
|  | Prof. Dr. Ing. George DRAGOI |

**Annex no. 2**

**SUBJECT DESCRIPTION**

1. **Information about the program**

|  |  |
| --- | --- |
| * 1. Higher education institution
 | University POLITEHNICA of Bucharest |
| 1.2 Faculty | Faculty of Engineering in Foreign Languages |
| 1.3 Department | Department of Engineering in Foreign Languages |
| 1.4 Field of study | Computers and Information Technology |
| 1.5 Study cycle | Undergraduate (license) |
| 1.6 Program / Qualification | Information Engineering (in English) / Engineer |

1. **Data about the subject**

|  |  |
| --- | --- |
| 2.1 Name of subject | Bioinformatics |
| 2.2 Course holder |  |
| 2.3 Seminar holder |  |
| 2.4 Laboratory/project holder |  |
| 2.5 Year of study | 4 | 2.6 Semester | 1 | 2.7 Evaluation type | E | 2.8 Subject type | DS/DO |

1. **Estimated time (hours per semester) of didactic activities**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **3.1 Number of hours per week** | 4 | course hours | 2 | seminar | 0 | laboratory | 2 |
| **3.2. Number of hours per semester** | 56 | course hours | 28 | seminar | 0 | laboratory | 28 |
| **3.3.Distribution of spend time:** |  | **h.** |
| Study of textbooks, bibliography and course notes |  | 14 |
| Supplementary study in library, on electronic platforms, on the fieldwork |  | 14 |
| Preparation of seminars/laboratories, home assignments, papers, portfolios, essays |  | 14 |
| Tutoring |  | 4 |
| Examinations  |  | 2 |
| Other activities  |  |  |
| **3.4 Total hours of individual study** | **48** |  |
| **3.5 Total hours per semester [[3]](#footnote-3)** | **104** |  |
| **3.6 Number of credits** | **4** |  |

1. **Preconditions (where relevant)**

|  |  |
| --- | --- |
| 4.1 curriculum- related | * **not relevant**
 |
| 4.2 competence - related | * **not relevant**
 |

1. **Facilities and equipment (where relevant)**

|  |  |
| --- | --- |
| 5.1 for the course | * **not relevant**
 |
| 5.2 for the course seminar | * **not relevant**
 |
| 5.3 for the laboratory/project | * **not relevant**
 |

1. **Specific competences acquired**

|  |  |
| --- | --- |
| Professional competences | * Solving problems using the tools of computer science and engineering.
* Design and integrate systems using technologies and programming environments.
* Design, lifecycle management, integration and integrity of hardware, software and communications systems.
* Design and exploitation of intelligent systems.
* Software Engineering
 |
| Transversal competences | * Honorable, responsible, ethical and within the law conduct, to guarantee the reputation of the profession.
* Identification, description and implementation of project management processes by taking different roles in the team and by description of the results in clear and concise verbal and written form, in a foreign language.
* Demonstrating the spirit of initiative and action to update the professional, economic and organizational culture knowledge.
 |

1. **Course objectives (as resulting from the grid of specific competences)**

|  |  |
| --- | --- |
| 7.1 Subject general goal | * Design and integrate bioinformatic systems using technologies and programming environments.
 |
| 7.2 Specific objectives | * Design and exploitation of intelligent systems in bioinformatics.
* Solving bioinformatic problems using the tools of computer science and engineering.
 |

1. **Content**

|  |  |  |
| --- | --- | --- |
| **8.1 Course** | **Teaching methods** | **Observations** |
| 1. Genetics and population analysis
 | Teacher-Centered Approach to Learning | **Course** 1 presents theoretical notions regarding living processes and how these processes are relating to the methods in question. The delivery of the **course** is relative to short-term and long-term objectives. |
| 1. Information and Entropy
 | Teacher-Centered Approach to Learning | **Course** 2 presents theoretical notions about Information and Entropy in living processes. |
| 1. Data and text mining
 | Teacher-Centered Approach to Learning | **Course** 3 presents some theoretical methods for determination of information structure in living processes. |
| 1. DNA Sequence analysis
 | Teacher-Centered Approach to Learning | **Course** 4 presents some analytical methods for DNA/protein sequence analysis. |
| 1. Sequence analysis using Markov chains
 | Teacher-Centered Approach to Learning | **Course** 5 presents the Markov process, and how it can be used to analyze biological sequences. |
| 1. Sequence analysis using Hidden Markov Models
 | Teacher-Centered Approach to Learning | **Course** 6 presents the Hidden Markov Models, and how it can be used to analyze biological sequences. |
| 1. Position-specific weight matrix (PSWM)
 | Teacher-Centered Approach to Learning | **Course** 7 presents the Position-specific weight matrix (PSWM) method for finding specific DNA sequences which have a biological role. |
| 1. Pairwise Sequence Alignment
 | Teacher-Centered Approach to Learning | **Course** 8 presents the Sequence Alignment method for an alignment of two biological sequences. |
| 1. Multiple Sequence Alignment
 | Teacher-Centered Approach to Learning | **Course** 9 presents the Multiple Sequence Alignment method for an alignment of *n* biological sequences, to determine relationships between species. |
| 1. Phylogenetic trees
 | Teacher-Centered Approach to Learning | **Course** 10 presents the use of Phylogenetic trees. |
| 1. DNA pattern method
 | Teacher-Centered Approach to Learning | **Course** 11 presents the DNA pattern method and applications. |
| 1. Computational Gene-finding
 | Teacher-Centered Approach to Learning | **Course** 12 presents computational methods for gene prediction. |
| 1. Genome analysis
 | Teacher-Centered Approach to Learning | **Course** 13 presents computational methods for whole genome analysis |
| 1. Comparative Genomics
 | Teacher-Centered Approach to Learning | **Course** 14 presents computational methods for comparative genomics. |
| **Bibliography*** Bioinformatics for Everyone, Mohammad Yaseen Sofi, Afshana Shafi, Khalid Z. Masoodi, Academic Press, 2021
* Mastering Python for Bioinformatics, [Ken Youens-Clark](http://libgen.rs/search.php?req=Ken+Youens-Clark&column=author), O'Reilly Media, 2021
* Computation in BioInformatics : Multidisciplinary Applications, Balamurugan et al., Wiley, 2021
* [Bioinformatics: A Practical Guide to NCBI Databases and Sequence Alignments](http://libgen.rs/book/index.php?md5=5C568A6116B0FD071A508565A1D14C9D), , CRC Press, 2021
* [Data Analytics in Bioinformatics: A Machine Learning Perspective](http://libgen.rs/book/index.php?md5=85CBFFB341666F6D1494F78B29B8EB9B), [Rabinarayan Satpathy](http://libgen.rs/search.php?req=Rabinarayan+Satpathy+%28editor%29&column=author) (edt) et all, Wiley 2021
 |
| **8.2 Seminar**  | **Teaching methods** | **Observations** |
| **8.3 Laboratory**  | **Teaching methods** | **Observations** |
| 1. The nucleotide percentages in the DNA sequence
 | Student-Centered Approach to Learning | **Laboratory** 1 - students apply the theoretical knowledge from course 1 by implementing software applications. Algorithms from course 1 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. Finding information content by measuring entropy
 | Student-Centered Approach to Learning | **Laboratory** 2 - students apply the theoretical knowledge from course 2 by implementing software applications. Algorithms from course 2 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. Analysis of DNA by designing a framework scanner based on sliding windows (part 1).
 | Student-Centered Approach to Learning | **Laboratory** 3 - students apply the theoretical knowledge from course 3 and 4 by implementing software applications. Algorithms from course 3 and 4 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. Analysis of DNA by designing a framework scanner based on sliding windows (part 2).
 | Student-Centered Approach to Learning | **Laboratory** 4 - students apply the theoretical knowledge from course 3 and 4 by implementing software applications. Algorithms from course 3 and 4 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. The implementation of an application for sequence analysis based on Markov chains
 | Student-Centered Approach to Learning | **Laboratory** 5 - students apply the theoretical knowledge from course 5 by implementing software applications. Algorithms from course 5 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. The implementation of an application for sequence analysis based on Hidden Markov Models
 | Student-Centered Approach to Learning | **Laboratory** 6 - students apply the theoretical knowledge from course 6 by implementing software applications. Algorithms from course 6 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. The implementation of an application for sequence analysis based on Position-specific weight matrix (PSWM)
 | Student-Centered Approach to Learning | **Laboratory** 7 - students apply the theoretical knowledge from course 7 by implementing software applications. Algorithms from course 7 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. The implementation of an application for Pairwise Sequence Alignment
 | Student-Centered Approach to Learning | **Laboratory** 8 - students apply the theoretical knowledge from course 8 by implementing software applications. Algorithms from course 8 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. The implementation of an application for Multiple Sequence Alignment
 | Student-Centered Approach to Learning | **Laboratory** 9 - students apply the theoretical knowledge from course 9 by implementing software applications. Algorithms from course 9 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. The implementation of an application for sequence analysis based on Phylogenetic trees
 | Student-Centered Approach to Learning | **Laboratory** 10 - students apply the theoretical knowledge from course 10 by implementing software applications. Algorithms from course 10 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. The implementation of an application for sequence analysis based on DNA pattern method
 | Student-Centered Approach to Learning | **Laboratory** 11 - students apply the theoretical knowledge from course 11 by implementing software applications. Algorithms from course 11 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. The implementation of an application for gene prediction.
 | Student-Centered Approach to Learning | **Laboratory** 12 - students apply the theoretical knowledge from course 12 by implementing software applications. Algorithms from course 12 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. The implementation of an application for genome analysis
 | Student-Centered Approach to Learning | **Laboratory** 13 - students apply the theoretical knowledge from course 13 by implementing software applications. Algorithms from course 13 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| 1. The implementation of an application for comparative genomics.
 | Student-Centered Approach to Learning | **Laboratory** 14 - students apply the theoretical knowledge from course 14 by implementing software applications. Algorithms from course 14 are described in detail and students are advised to make their implementation in programming languages of their choice, as long as the objectives are satisfied. |
| **Bibliography*** Bioinformatics for Everyone, Mohammad Yaseen Sofi, Afshana Shafi, Khalid Z. Masoodi, Academic Press, 2021
* Mastering Python for Bioinformatics, [Ken Youens-Clark](http://libgen.rs/search.php?req=Ken+Youens-Clark&column=author), O'Reilly Media, 2021
* Computation in BioInformatics : Multidisciplinary Applications, Balamurugan et al., Wiley, 2021
* [Bioinformatics: A Practical Guide to NCBI Databases and Sequence Alignments](http://libgen.rs/book/index.php?md5=5C568A6116B0FD071A508565A1D14C9D), , CRC Press, 2021
* [Data Analytics in Bioinformatics: A Machine Learning Perspective](http://libgen.rs/book/index.php?md5=85CBFFB341666F6D1494F78B29B8EB9B), [Rabinarayan Satpathy](http://libgen.rs/search.php?req=Rabinarayan+Satpathy+%28editor%29&column=author) (edt) et all, Wiley 2021
 |

1. **Subject’s relevance to the epistemic community, professional associations and representative employers in fields significant for the program**

|  |
| --- |
| * **Relevant for new diagnostic methods and scientific research related to biology, biochemistry and medicine**
 |

1. **Assessment**

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | 10.1 Evaluation criteria | 10.2 Evaluation methods | 10.3 Weight in final grade |
| 10.4 Course | Final Exam | Evaluation Form which consists of questions and problems. | 50 points |
|  |  |  |
| 10.5 Seminar |  |  |  |
|  |  |  |
| 10.6 Laboratory/Project | Written computer code/program assignments | Computer code assessment - which consists of a given input and a desired output. Code optimization is also evaluated. | 50 points |
|  |  |  |
| 10.7 Minimal standard of performance |
| * **50** **points**
 |

|  |  |  |
| --- | --- | --- |
| **Filling in date** | **Signature of the course holder** | **Signature of the applications holder(s)** |

|  |  |
| --- | --- |
| **Date of endorsement in the department** | **Signature of the Department Director** |
|  | Prof. Dr. Ing. George DRAGOI |

**Anexa nr. 2**

**FIŞA DISCIPLINEI**

1. **Date despre program**

|  |  |
| --- | --- |
| * 1. Instituţia de învăţământ superior
 | Universitatea POLITEHNICA din Bucureşti |
| 1.2 Facultatea  | Facultatea de Inginerie în Limbi Străine |
| 1.3 Departamentul | Departamentul de Inginerie în Limbi Străine |
| 1.4 Domeniul de studii | Calculatore si tehnologia informatiei |
| 1.5 Ciclul de studii | Licenta |
| 1.6 Programul de studii / Calificarea | Ingineria informației (în limba engleză)/ inginer |

1. **Date despre disciplină**

|  |  |
| --- | --- |
| 2.1 Denumire disciplina | Bioinformatică |
| 2.2 Titular activităţi de curs |  |
| 2.3 Titular activităţi de seminar |  |
| 2.4 Titular activităţi de laborator/lucrari |  |
| 2.5 Anul de studiu | 4 | 2.6 Semestrul | 1 | 2.7 Tipul de evaluare | E | 2.8 Regimul disciplinei | DS/DO |

1. **Timpul total estimat (ore pe semestru) al activităţilor didactice**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **3.1 Număr de ore pe săptămână** | 4 | din care ore curs | 2 |  seminar | 0 | laborator | 2 |
| **3.2. Numar ore pe semestru** | 56 | din care ore curs | 28 |  seminar | 0 | laborator | 28 |
| **3.3.Distribuţia fondului de timp:** |  | **ore** |
| Studiul după manual, suport de curs, bibliografie şi notiţe |  | 14 |
| Documentare suplimentară în bibliotecă, pe platformele electronice de specialitate / pe teren |  | 14 |
| Pregătire seminarii / laboratoare, teme, referate, portofolii şi eseuri |  | 14 |
| Tutoriat  |  | 4 |
| Examinări  |  | 2 |
| Alte activităţi  |  |  |
| **3.4 Total ore studiu individual** | **48** |  |
| **3.5 Total ore pe semestru [[4]](#footnote-4)** | **104** |  |
| **3.6 Numărul de credite** | **4** |  |

1. **Precondiţii (acolo unde este cazul)**

|  |  |
| --- | --- |
| 4.1 de curriculum | * nu este cazul
 |
| 4.2 de competenţe | * nu este cazul
 |

1. **Condiţii (acolo unde este cazul)**

|  |  |
| --- | --- |
| 5.1 de desfăşurare a cursului | * nu este cazul
 |
| 5.2 de desfăşurare a seminarului | * nu este cazul
 |
| 5.3 de desfăşurare a laboratorului | * nu este cazul
 |

1. **Competenţele specifice acumulate**

|  |  |
| --- | --- |
| Competenţe profesionale | * Soluţionarea problemelor folosind instrumentele ştiinţei şi ingineriei calculatoarelor.
* Proiectarea şi integrarea sistemelor informatice utilizând tehnologii şi medii de programare.
* Proiectarea si utilizarea sistemelor inteligente.
 |
| Competenţe transversale | * Comportarea onorabilă, responsabilă, etică, în spiritul legii pentru a asigura reputaţia profesiei.
* Identificarea, descrierea şi derularea proceselor din managementul proiectelor, cu preluarea diferitelor roluri în echipă şi descrierea clară şi concisă, verbal şi în scris, într-o limbă de circulaţie internaţională, a rezultatelor din domeniul de activitate.
* Demonstrarea spiritului de iniţiativă şi acţiune pentru actualizarea cunoştinţelor profesionale, economice şi de cultură organizaţională.
 |

1. **Obiectivele disciplinei (reieşind din grila competenţelor specifice acumulate)**

|  |  |
| --- | --- |
| 7.1 Obiectivul general al disciplinei | • Proiectarea și integrarea sistemelor bioinformatice folosind tehnologii și medii de programare. |
| * 1. Obiectivele specifice
 | • Proiectarea și exploatarea sistemelor inteligente în bioinformatică. • Rezolvarea problemelor bioinformatice folosind instrumentele informaticii și ingineriei. |

1. **Conţinuturi**

|  |  |  |
| --- | --- | --- |
| **8.1 Curs** | **Metode de predare** | **Observaţii** |
| 1. Genetica și analiza populației
 | Prelegere | - |
| 1. Informatie si entropie
 | Prelegere | - |
| 1. Date și detectia structurilor informationale in secvente text
 | Prelegere | - |
| 1. Analiza secventelor ADN
 | Prelegere | - |
| 1. Analiza secventelor prin folosirea lanturilor lui Markov
 | Prelegere | - |
| 1. Analiza secventelor prin folosirea Modelelor Markov Ascunse
 | Prelegere | - |
| 1. Analiza secventelor prin folosirea de matrici specifice de pozitie
 | Prelegere | - |
| 1. Alinieri de perechi de secvențe
 | Prelegere | - |
| 1. Alinieri multiple de secvente
 | Prelegere | - |
| 1. Arbori filogenetici
 | Prelegere | - |
| 1. Metoda sabloanelor ADN
 | Prelegere | - |
| 1. Predictia de gene
 | Prelegere | - |
| 1. Analiza genomului
 | Prelegere | - |
| 1. Genomica comparata
 | Prelegere | - |
| **Bibliografie*** Bioinformatics for Everyone, Mohammad Yaseen Sofi, Afshana Shafi, Khalid Z. Masoodi, Academic Press, 2021
* Mastering Python for Bioinformatics, [Ken Youens-Clark](http://libgen.rs/search.php?req=Ken+Youens-Clark&column=author), O'Reilly Media, 2021
* Computation in BioInformatics : Multidisciplinary Applications, Balamurugan et al., Wiley, 2021
* [Bioinformatics: A Practical Guide to NCBI Databases and Sequence Alignments](http://libgen.rs/book/index.php?md5=5C568A6116B0FD071A508565A1D14C9D), , CRC Press, 2021
* [Data Analytics in Bioinformatics: A Machine Learning Perspective](http://libgen.rs/book/index.php?md5=85CBFFB341666F6D1494F78B29B8EB9B), [Rabinarayan Satpathy](http://libgen.rs/search.php?req=Rabinarayan+Satpathy+%28editor%29&column=author) (edt) et all, Wiley 2021
 |
| **8.2 Seminar**  | **Metode de predare** |  |
| **8.3 Laborator**  | **Metode de predare** |  |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 1.
 | Instructaj | - |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 2.
 | Instructaj | - |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 3.
 | Instructaj | - |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 4.
 | Instructaj | **-** |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 5.
 | Instructaj | **-** |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 6.
 | Instructaj | **-** |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 7.
 | Instructaj | **-** |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 8.
 | Instructaj | **-** |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 9.
 | Instructaj | **-** |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 10.
 | Instructaj | **-** |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 11.
 | Instructaj | **-** |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 12.
 | Instructaj | **-** |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 13.
 | Instructaj | **-** |
| 1. Implementare aplicatii software bazate pe informatiile teoretice predate in cursul 14.
 | Instructaj | **-** |
| **Bibliografie*** Bioinformatics for Everyone, Mohammad Yaseen Sofi, Afshana Shafi, Khalid Z. Masoodi, Academic Press, 2021
* Mastering Python for Bioinformatics, [Ken Youens-Clark](http://libgen.rs/search.php?req=Ken+Youens-Clark&column=author), O'Reilly Media, 2021
* Computation in BioInformatics : Multidisciplinary Applications, Balamurugan et al., Wiley, 2021
* [Bioinformatics: A Practical Guide to NCBI Databases and Sequence Alignments](http://libgen.rs/book/index.php?md5=5C568A6116B0FD071A508565A1D14C9D), , CRC Press, 2021

[Data Analytics in Bioinformatics: A Machine Learning Perspective](http://libgen.rs/book/index.php?md5=85CBFFB341666F6D1494F78B29B8EB9B), [Rabinarayan Satpathy](http://libgen.rs/search.php?req=Rabinarayan+Satpathy+%28editor%29&column=author) (edt) et all, Wiley 2021 |

1. **Colaborarea conţinuturilor disciplinei cu aşteptările reprezentanţilor comunităţii epistemice, asociaţiilor profesionale şi angajatori reprezentativi din domeniul aferent programului**

|  |
| --- |
| * Relevante pentru noi metode de diagnostic și de cercetare științifică referitoare la biologie, biochimie și medicină
 |

1. **Evaluare**

|  |  |  |  |
| --- | --- | --- | --- |
| Tip activitate | 10.1 Criterii de evaluare | 10.2 Metode de evaluare | 10.3 Pondere din nota finală |
| 10.4 Curs | Examen final | Formă de evaluare care constă în întrebări și probleme. | 50 puncte |
|  |  |  |
| 10.5 Seminar |  |  |  |
|  |  |  |
| 10.6 Laborator/lucrari | Scrierea de cod sursă / teme | Se analizeaza datele generate de aplicatia software. Optimizarea codului sursa este de asemenea evaluată. | 50 puncte |
|  |  |  |
| 10.7 Standard minim de performanţă |
| * **50 puncte**
 |

|  |  |  |
| --- | --- | --- |
| **Data completării** | **Semnătura titularului de curs** | **Semnătura titularului/ titularilor de aplicaţii** |

|  |  |
| --- | --- |
| **Data avizării în departament** | **Semnătura directorului de Departament** |
|  | Prof. Dr. Ing. George DRAGOI |

**Annexe no. 2**

**FICHE DE LA DISCIPLINE**

1. **Informations sur le programme**

|  |  |
| --- | --- |
| * 1. Institut d’enseignement supérieur
 | Université POLITEHNICA de Bucarest |
| 1.2 Faculté | Faculté d’Ingénierie en Langues Etrangères |
| 1.3 Département | Département d’Ingénierie en Langues Etrangères |
| 1.4 Domaine d’études | Ordinateurs et technologie de l’information |
| 1.5 Cycle d’études | Licence |
| 1.6 Programme d’études / Qualification | Ingénierie de l’information (en français) /ingénieur |

1. **Informations sur la discipline**

|  |  |
| --- | --- |
| 2.1 Nom de la discipline | Bioinformatique |
| 2.2 Titulaire de cours |  |
| 2.3 Titulaire pour les activités de séminaire |  |
| 2.4 Titulaire pour les activités du laboratoire/TP,s |  |
| 2.5 An d’études | 4 | 2.6 Semestre | 1 | 2.7 Type d’évaluation | E | 2.8 Régime de la discipline | DS/DA |

1. **Temps total estimé (heures par semestre) pour les activités didactiques**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **3.1 Nombre d’heures par semaine** | 4 | dont heures de cours | 2 | séminaire | 0 | laboratoire | 2 |
| **3.2. Nombre d’heures par semestre** | 56 | dont heures de cours | 28 | séminaire | 0 | laboratoire | 28 |
| **3.3. Distribution du fond de temps:**  |  | **heures** |
| Etude d’après le manuel, support de cours, références  |  | 14 |
| Documentation supplémentaire dans les bibliothèques, sur les plateformes électroniques de spécialité/sur le terrain |  | 14 |
| Préparation des séminaires/laboratoires, devoirs, rapports et essais.  |  | 14 |
| Tutoriat  |  | 4 |
| Examinations |  | 2 |
| Autre activités |  |  |
| **3.4 Total heures d’étude individuel** | **48** |  |
| **3.5 Total Heures par semestre [[5]](#footnote-5)** | **104** |  |
| **3.6 Nombre des crédits** | **4** |  |

1. **Prerequis (la ou il y a le cas)**

|  |  |
| --- | --- |
| 4.1 de curriculum | * non applicable
 |
| 4.2 de compétences | * non applicable
 |

1. **Termes (la ou il y a le cas)**

|  |  |
| --- | --- |
| 5.1 du déroulement du cours | * non applicable
 |
| 5.2 du déroulement du séminaire | * non applicable
 |
| 5.3 du déroulement du laboratoire | * non applicable
 |

1. **Compétences spécifiques acquises**

|  |  |
| --- | --- |
| Compétences professionnelles | * Résoudre des problèmes à l'aide d'outils informatiques et d'ingénierie.
* Conception et intégration de systèmes d'information à l'aide de technologies et d'environnements de programmation.
* Conception et utilisation de systèmes intelligents.
 |
| Compétences transversales | * Une conduite honorable, responsable, éthique dans l'esprit de la loi pour assurer la réputation de la profession.
* Identifier, décrire et mettre en œuvre les processus de gestion de projet, assumer les différents rôles dans l'équipe et décrire de manière claire et concise, verbalement et par écrit, dans une langue de circulation internationale, les résultats dans le domaine d'activité.
* Faire preuve d'esprit d'initiative et d'action pour mettre à jour les connaissances de la culture professionnelle, économique et organisationnelle.
 |

1. **Objectifs de la discipline (d’après la grille des compétences spécifiques accumulés)**

|  |  |
| --- | --- |
| 7.1 Objectif général de la discipline | * • Conception et intégration de systèmes bioinformatiques utilisant des technologies et des environnements de programmation.
 |
| 7.2 Objectifs spécifiques | * • Conception et exploitation de systèmes intelligents en bioinformatique.
* • Résolution de problèmes bioinformatiques à l'aide d'outils informatiques et d'ingénierie.
 |

1. **Contenus**

|  |  |  |
| --- | --- | --- |
| **8.1 Cours** | **Méthodes d’enseignement** | **Observations** |
| 1. L'analyse génétique de la population2. Information et entropie3. Les structures de données et la détection d'informations dans les séquence de texte4. Analyse de la séquence d'ADN5. L'analyse de séquence en utilisant les chaînes de Markov6. L'analyse des séquences en utilisant les modèles de Markov cachés7. L'analyse des séquences en utilisant matrices spécifiques de positions 8. L'alignement des paires de séquences9. L'alignement multiple des séquences10. Les arbres phylogénétiques11. La méthode des modèles d'ADN12. La prédiction du gène13. Le génome14. La génomique comparative | Conférence / Présentation |  |
| **Bibliographie (Références)*** Bioinformatics for Everyone, Mohammad Yaseen Sofi, Afshana Shafi, Khalid Z. Masoodi, Academic Press, 2021
* Mastering Python for Bioinformatics, [Ken Youens-Clark](http://libgen.rs/search.php?req=Ken+Youens-Clark&column=author), O'Reilly Media, 2021
* Computation in BioInformatics : Multidisciplinary Applications, Balamurugan et al., Wiley, 2021
* [Bioinformatics: A Practical Guide to NCBI Databases and Sequence Alignments](http://libgen.rs/book/index.php?md5=5C568A6116B0FD071A508565A1D14C9D), , CRC Press, 2021

[Data Analytics in Bioinformatics: A Machine Learning Perspective](http://libgen.rs/book/index.php?md5=85CBFFB341666F6D1494F78B29B8EB9B), [Rabinarayan Satpathy](http://libgen.rs/search.php?req=Rabinarayan+Satpathy+%28editor%29&column=author) (edt) et all, Wiley 2021 |
| **8.2 Séminaire**  | **Méthodes d’enseignement** | **Observations** |
| **8.3 Laboratoire**  |  |  |
| Mise en œuvre logicielle basée sur des informations théoriques enseignées au cours.1. Les pourcentages de nucléotides dans la séquence d'ADN2. Trouver le contenu de l'information en mesurant l'entropie3. Analyse de l'ADN en concevant un cadre scanner basé sur des fenêtres coulissantes (partie 1).4. Analyse de l'ADN en concevant un cadre scanner basé sur des fenêtres coulissantes (partie 2).5. La mise en place d'une application d'analyse de séquences basée sur les chaînes de Markov6. La mise en œuvre d'une application d'analyse de séquences basée sur des modèles de Markov cachés7. La mise en œuvre d'une application d'analyse de séquence basée sur la matrice de poids spécifique à la position (PSWM)8. La mise en place d'une application pour Pairwise Sequence Alignment9. La mise en œuvre d'une application pour l'alignement de séquences multiples10. La mise en place d'une application d'analyse de séquences basée sur des arbres phylogénétiques11. La mise en place d'une application d'analyse de séquences basée sur la méthode des patrons d'ADN12. La mise en place d'une application de prédiction génétique.13. La mise en place d'une application d'analyse du génome14. La mise en place d'une application de génomique comparative. | Instruction |  |
| **Bibliographie*** Bioinformatics for Everyone, Mohammad Yaseen Sofi, Afshana Shafi, Khalid Z. Masoodi, Academic Press, 2021
* Mastering Python for Bioinformatics, [Ken Youens-Clark](http://libgen.rs/search.php?req=Ken+Youens-Clark&column=author), O'Reilly Media, 2021
* Computation in BioInformatics : Multidisciplinary Applications, Balamurugan et al., Wiley, 2021
* [Bioinformatics: A Practical Guide to NCBI Databases and Sequence Alignments](http://libgen.rs/book/index.php?md5=5C568A6116B0FD071A508565A1D14C9D), , CRC Press, 2021

[Data Analytics in Bioinformatics: A Machine Learning Perspective](http://libgen.rs/book/index.php?md5=85CBFFB341666F6D1494F78B29B8EB9B), [Rabinarayan Satpathy](http://libgen.rs/search.php?req=Rabinarayan+Satpathy+%28editor%29&column=author) (edt) et all, Wiley 2021 |

1. **Collaboration des contenus de la discipline avec les attentes de la communauté épistémique, des associations professionnelles et des employeurs reconnus dans le domaine du programme**

|  |
| --- |
| * Pertinents pour les nouveaux diagnostics et de la recherche scientifique liée à la biologie, la biochimie et la médecine
 |

1. **Evaluation**

|  |  |  |  |
| --- | --- | --- | --- |
| Type d’activité | 10.1 Critères d’évaluation | 10.2 Méthodes d’évaluation | 10.3 part (pourcentage) de la note finale |
| 10.4 Cours | Exam / Évaluation finale | Questions et problèmes | 50% |
|  |  |  |
| 10.5 Séminaire |  |  |  |
|  |  |  |
| 10.6 Laboratoire/TPs | L'écriture du code source / devoirs | On analyse les données générées par le logiciel d'application. L'optimisation du code source est également évaluée. | 50% |
|  |  |  |
|  |
| 10.7 Standard minime de performance |
| * 50 points
 |
| **Date d’élaboration** | **Signature du titulaire du cours** | **Signature du/des titulaire/titulaires des applications** |
| **Date de l’avis du département** | **Signature du directeur de Département** |
|  | Prof. Dr. Ing. George DRAGOI |

**Anexa nr. 2**

**FIŞA DISCIPLINEI**

1. **Date despre program**

|  |  |
| --- | --- |
| * 1. Instituţia de învăţământ superior
 | Universitatea POLITEHNICA din Bucureşti |
| 1.2 Facultatea  | Facultatea de Inginerie în Limbi Străine |
| 1.3 Departamentul | Departamentul de Inginerie în Limbi Străine |
| 1.4 Domeniul de studii | Calculatoare si tehnologia informatiei |
| 1.5 Ciclul de studii | Licenta |
| 1.6 Programul de studii / Calificarea | Ingineria informatiei (în limba franceză) /inginer  |

1. **Date despre disciplină**

|  |  |
| --- | --- |
| 2.1 Denumire disciplina | Bioinformatică |
| 2.2 Titular activităţi de curs |  |
| 2.3 Titular activităţi de seminar |  |
| 2.4 Titular activităţi de laborator/lucrari |  |
| 2.5 Anul de studiu | 4 | 2.6 Semestrul | 1 | 2.7 Tipul de evaluare | E | 2.8 Regimul disciplinei | DS/ DA |

1. **Timpul total estimat (ore pe semestru) al activităţilor didactice**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **3.1 Număr de ore pe săptămână** | 4 | din care ore curs | 2 |  seminar | 0 | laborator | 2 |
| **3.2. Numar ore pe semestru** | 56 | din care ore curs | 28 |  seminar | 0 | laborator | 28 |
| **3.3.Distribuţia fondului de timp:** |  | **ore** |
| Studiul după manual, suport de curs, bibliografie şi notiţe |  | 14 |
| Documentare suplimentară în bibliotecă, pe platformele electronice de specialitate / pe teren |  | 14 |
| Pregătire seminarii / laboratoare, teme, referate, portofolii şi eseuri |  | 14 |
| Tutoriat  |  | 4 |
| Examinări  |  | 2 |
| Alte activităţi  |  |  |
| **3.4 Total ore studiu individual** | **48** |  |
| **3.5 Total ore pe semestru [[6]](#footnote-6)** | **104** |  |
| **3.6 Numărul de credite** | **4** |  |

1. **Precondiţii (acolo unde este cazul)**

|  |  |
| --- | --- |
| 4.1 de curriculum | * nu este cazul
 |
| 4.2 de competenţe | * nu este cazul
 |

1. **Condiţii (acolo unde este cazul)**

|  |  |
| --- | --- |
| 5.1 de desfăşurare a cursului | * nu este cazul
 |
| 5.2 de desfăşurare a seminarului | * nu este cazul
 |
| 5.3 de desfăşurare a laboratorului | * nu este cazul
 |

1. **Competenţele specifice acumulate**

|  |  |
| --- | --- |
| Competenţe profesionale | * Soluţionarea problemelor folosind instrumentele ştiinţei şi ingineriei calculatoarelor.
* Proiectarea şi integrarea sistemelor informatice utilizând tehnologii şi medii de programare.
* Proiectarea si utilizarea sistemelor inteligente.
 |
| Competenţe transversale | * Comportarea onorabilă, responsabilă, etică, în spiritul legii pentru a asigura reputaţia profesiei.
* Identificarea, descrierea şi derularea proceselor din managementul proiectelor, cu preluarea diferitelor roluri în echipă şi descrierea clară şi concisă, verbal şi în scris, într-o limbă de circulaţie internaţională, a rezultatelor din domeniul de activitate.
* Demonstrarea spiritului de iniţiativă şi acţiune pentru actualizarea cunoştinţelor profesionale, economice şi de cultură organizaţională.
 |

1. **Obiectivele disciplinei (reieşind din grila competenţelor specifice acumulate)**

|  |  |
| --- | --- |
| 7.1 Obiectivul general al disciplinei | • Proiectarea și integrarea sistemelor bioinformatice folosind tehnologii și medii de programare. |
| 7.2 Obiectivele specifice | • Proiectarea și exploatarea sistemelor inteligente în bioinformatică. • Rezolvarea problemelor bioinformatice folosind instrumentele informaticii și ingineriei. |

1. **Conţinuturi**

|  |  |  |
| --- | --- | --- |
| **8.1 Curs** | **Metode de predare** | **Observaţii** |
| 1. Genetica și analiza populației
 | Prelegere | - |
| 1. Informatie si entropie
 | Prelegere | - |
| 1. Date și detectia structurilor informationale in secvente text
 | Prelegere | - |
| 1. Analiza secventelor ADN
 | Prelegere | - |
| 1. Analiza secventelor prin folosirea lanturilor lui Markov
 | Prelegere | - |
| 1. Analiza secventelor prin folosirea Modelelor Markov Ascunse
 | Prelegere | - |
| 1. Analiza secventelor prin folosirea de matrici specifice de pozitie
 | Prelegere | - |
| 1. Alinieri de perechi de secvențe
 | Prelegere | - |
| 1. Alinieri multiple de secvente
 | Prelegere | - |
| 1. Arbori filogenetici
 | Prelegere | - |
| 1. Metoda sabloanelor ADN
 | Prelegere | - |
| 1. Predictia de gene
 | Prelegere | - |
| 1. Analiza genomului
 | Prelegere | - |
| 1. Genomica comparata
 | Prelegere | - |
| **Bibliografie*** Bioinformatics for Everyone, Mohammad Yaseen Sofi, Afshana Shafi, Khalid Z. Masoodi, Academic Press, 2021
* Mastering Python for Bioinformatics, [Ken Youens-Clark](http://libgen.rs/search.php?req=Ken+Youens-Clark&column=author), O'Reilly Media, 2021
* Computation in BioInformatics : Multidisciplinary Applications, Balamurugan et al., Wiley, 2021
* [Bioinformatics: A Practical Guide to NCBI Databases and Sequence Alignments](http://libgen.rs/book/index.php?md5=5C568A6116B0FD071A508565A1D14C9D), , CRC Press, 2021

[Data Analytics in Bioinformatics: A Machine Learning Perspective](http://libgen.rs/book/index.php?md5=85CBFFB341666F6D1494F78B29B8EB9B), [Rabinarayan Satpathy](http://libgen.rs/search.php?req=Rabinarayan+Satpathy+%28editor%29&column=author) (edt) et all, Wiley 2021 |
| **8.2 Seminar**  | **Metode de predare** |  |
| **8.3 Laborator**  | **Metode de predare** |  |
| 1. Procentele de nucleotide din secvența ADN2. Găsirea conținutului de informații prin măsurarea entropiei3. Analiza ADN-ului prin proiectarea unui scaner cadru bazat pe ferestre glisante (partea 1).4. Analiza ADN-ului prin proiectarea unui scaner cadru bazat pe ferestre glisante (partea 2).5. Implementarea unei aplicații de analiză a secvenței bazată pe lanțuri Markov6. Implementarea unei aplicații pentru analiza secvenței bazată pe modele Markov ascunse7. Implementarea unei aplicații pentru analiza secvenței bazată pe matricea de greutate specifică poziției (PSWM)8. Implementarea unei aplicații pentru Pairwise Sequence Alignment9. Implementarea unei aplicații pentru Multiple Sequence Alignment10. Implementarea unei aplicații de analiză a secvenței bazată pe arbori filogenetici11. Implementarea unei aplicații de analiză a secvenței bazată pe metoda modelului ADN12. Implementarea unei aplicații pentru predicția genelor.13. Implementarea unei aplicații pentru analiza genomului14. Implementarea unei aplicații pentru genomica comparativă. |  | - |
| **Bibliografie*** Bioinformatics for Everyone, Mohammad Yaseen Sofi, Afshana Shafi, Khalid Z. Masoodi, Academic Press, 2021
* Mastering Python for Bioinformatics, [Ken Youens-Clark](http://libgen.rs/search.php?req=Ken+Youens-Clark&column=author), O'Reilly Media, 2021
* Computation in BioInformatics : Multidisciplinary Applications, Balamurugan et al., Wiley, 2021
* [Bioinformatics: A Practical Guide to NCBI Databases and Sequence Alignments](http://libgen.rs/book/index.php?md5=5C568A6116B0FD071A508565A1D14C9D), , CRC Press, 2021

[Data Analytics in Bioinformatics: A Machine Learning Perspective](http://libgen.rs/book/index.php?md5=85CBFFB341666F6D1494F78B29B8EB9B), [Rabinarayan Satpathy](http://libgen.rs/search.php?req=Rabinarayan+Satpathy+%28editor%29&column=author) (edt) et all, Wiley 2021 |

1. **Colaborarea conţinuturilor disciplinei cu aşteptările reprezentanţilor comunităţii epistemice, asociaţiilor profesionale şi angajatori reprezentativi din domeniul aferent programului**

|  |
| --- |
| * Relevante pentru noi metode de diagnostic și de cercetare științifică referitoare la biologie, biochimie și medicină
 |

1. **Evaluare**

|  |  |  |  |
| --- | --- | --- | --- |
| Tip activitate | 10.1 Criterii de evaluare | 10.2 Metode de evaluare | 10.3 Pondere din nota finală |
| 10.4 Curs | Examen final | Formă de evaluare care constă în întrebări și probleme. | 50 puncte |
|  |  |  |
| 10.5 Seminar |  |  |  |
|  |  |  |
| 10.6 Laborator/lucrari | Scrierea de cod sursă / teme | Se analizeaza datele generate de aplicatia software. Optimizarea codului sursa este de asemenea evaluată. | 50 puncte |
|  |  |  |
| 10.7 Standard minim de performanţă |
| * **50 puncte**
 |

|  |  |  |
| --- | --- | --- |
| **Data completării** | **Semnătura titularului de curs** | **Semnătura titularului/ titularilor de aplicaţii** |
| **Data avizării în departament** | **Semnătura directorului de Departament** |
|  | Prof. Dr. Ing. George DRAGOI |

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