Modern Programming Languages

Semester No 7-8	Code BI-427	Credit Hours 3-0

Course description:

This course will introduce the fundamental features of modern programming languages and equip students with necessary skills for the critical evaluation of existing and future programming languages. Also, students study the formal representation of syntax and semantics of programming languages, and mechanisms for the lexical and syntactic analysis of programs. Students will be exposed to programming languages from three specific paradigms, namely, object-oriented, functional, and logical programming.

Recommended Books:

1. *Webber, A. B. (2010). Modern programming languages: A practical introduction. Franklin, Beedle Associates Inc..*
2. *Davis, A. L. (2020). Modern programming made easy: using Java, Scala, Groovy, and JavaScript. Apress.*
3. *Sebesta, R. W. (2004). Concepts of programming languages. Pearson Education India.*

Prerequisite:
1. Programming Fundamentals
2. Object Oriented Programming

Course Learning Outcomes:

After completing this course, students will understand the need of different programming languages and the underlying issues. The students will understand different elements of programming languages. They will learn comparison of programming languages and precise definitions to programming-language features. The students will be able to apply programming language knowledge and write better programs by exploiting modern language features such as higher-order functions and objects.

Assessment system:

Quizzes	10-15%
Assignments	5-10%
MSE	30-40%
ESE	40-50%

Week wise Lecture Plan:

Week	Lecture Topic	Quizzes	Assignments
1	History of programming language design		
2			
3	Description of syntax and semantics	1	1
4	Lexical and syntactic analysis		
5	Programming language features (names, binding, data types, expressions and assignments, control structures, subprograms	2	2
6			
7			
8			
9	**MIDTERMS**		
10	Description of the purposes of programming and software development		
11	Description of common operators	3	
12	Implementation of Control Structure of different programming Languages		3
13			
14	Implementation of object-oriented programming techniques		
15	Selection of the appropriate language for any project	4	4
16	Comparison of the evaluation criterion of computer languages.		
17			

18	**END SEMESTER EXAMINATION**		

Personalized Medicine

Semester No	Code	Credit Hours
7-8	BI-4XX	3 – 0

Course Description

Precision or stratified medicine transforms healthcare from a one size fits all approach to a more tailored disease prevention and personalised treatment approach, that takes into account variability in genes, environment, and lifestyle for each person. This course reviews the key genomic technologies and computational approaches that are driving advances in prognostics, diagnostics, and treatment. Emphasis will return to issues surrounding the context of analysis of genome and proteome in medicine including: what does a physician need to know? what sorts of questions will s/he likely encounter from patients? how should s/he respond?

Text And Material

1. Genomic and Personalized Medicine by Huntington F. Willard, Ph.D. and Geoffrey S. Ginsburg
2. Can Precision Medicine be Personal; Can Personalized Medicine be Precise? By by Y. Michael Barilan, Margherita Brusa, Aaron Ciechanover
3. Progress and Challenges in Precision Medicine by Mukesh Verma and Debmalya Barh

Course Learning Outcomes:

Upon successful completion of the course, the student will be trained in:

1. principles of precision, translational and stratified medicine and the clinical impact of individual molecular and lifestyle variability
2. real benefits of genomics can be anticipated in the near future in terms of new drugs and treatments
3. useful features of alternative genomic technologies today and for the near future

Assessment System

Quizzes	10-15%
Assignments	5-10%
Midterms	30-40%
ESE	40-50%

Week wise Lecture Plan:

Week No	Description	Quizzes	Assignment
1	Introduction & History of Personalized Medicine		
2	The precision paradox - How personalized medicine increases uncertainty • Personalization, Individuation and the Ethos of Precision Medicine,		01
3	When does precision matter? Personalised medicine from the perspective of public health • Concepts of Population Genomics		
4	Human Health and Disease: Interaction Between the Genome and the Environment	01	
5	Clinical Next-Generation Sequencing: Enabling Precision Medicine	02	
6	Enabling Strategies in the Translation of Genomics into Medicine		
7	Genomics and Precision Medicine • The Role of Genomics and Genetics in Drug Discovery and Development		02
8	Phenotyping in Precision Medicine		
9	**MIDTERMS**		

10	Role of Pharmacogenomics in Drug Development	03	
11	Disease-based genomic and personalized medicine: • Cancer Genetic and Oncology	04	03
12	Disease-based genomic and personalized medicine: • Cardiovascular Mediine		
13	Disease-based genomic and personalized medicine: • Metabolic Disease		
14	Disease-based genomic and personalized medicine: • Neuropsychiatric Disease		
15	Disease-based genomic and personalized medicine: • Infectious Disease		
16	The Problematic Side of Precision Medicine	04	04
17	Policy Challenges in Genomic and Personalized Medicine		
18	**END SEMESTER EXAMINATION**		