

## **Computational Vaccinology**

<b>Semester No 7-8</b>	<b>Code BI-4XX</b>	<b>Credit Hours 3-0</b>
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### **Course description:**

Computational vaccinology overlaps with Computational Immunology, reverse vaccinology, vaccinomics, and systems vaccinology, to address questions in vaccinology. It is an interdisciplinary field, uses computational resource and algorithm to help in design vaccine. In this course, recent developments in computational vaccinology, highlighting work in epitope and antigen identification, and the discovery of delivery vectors and adjuvants, etc. are highlighted. These diverse activities all have the potential to significantly reduce the laboratory resource needed for efficient vaccine discovery. This course offers how computational analysis of pathogenic genomes by epitope mapping and reverse vaccinology can provide viable vaccine targets.

### **Recommended Books:**

1. Rappuoli, R., & Bagnoli, F. (2011). Vaccine design: Innovative approaches and novel strategies. Horizon Scientific Press.
2. Sakharkar, K. R., Sakharkar, M. K., & Chandra, R. (2015). Post-Genomic Approaches in Drug and Vaccine Development.
3. Tong, J. C., & Ranganathan, S. (2013). Computer-aided vaccine design. Elsevier.

### **Prerequisite:**

1. Proteomics

### **Course Learning Outcomes:**

After the course the students will be able to apply different concepts of vaccinology in computational domain.

**Assessment system:**

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

**Week wise Lecture Plan:**

<b>Week</b>	<b>Lecture Topic</b>	<b>Quizzes</b>	<b>Assignments</b>
1	Introduction to Computational Vaccinology		
2	Design of New Vaccines in the Genomic and Post-genomic Era		1
3	Application of Computational Immunology to Vaccine Design	1	
4	Target Identification for Vaccines		
5	Computational vaccinology workflow	2	
6	Cancer vaccines: computational modeling approaches		
7	Reverse Vaccinology & Vaccine screening		
8	Epitope-driven approaches for vaccine design		3
9	<b>MIDTERMS</b>		
10	DNA vaccines	3	
11	Allergen Bioinformatics		
12	Identification of vaccine targets in pathogens		4
13	Computational Vaccinology: Quantitative Approaches		
14			
15	Structural and Computational Biology in the Design of Immunogenic	4	
16			
17	Vaccine Antigens		
18	<b>END SEMESTER EXAMINATION</b>		