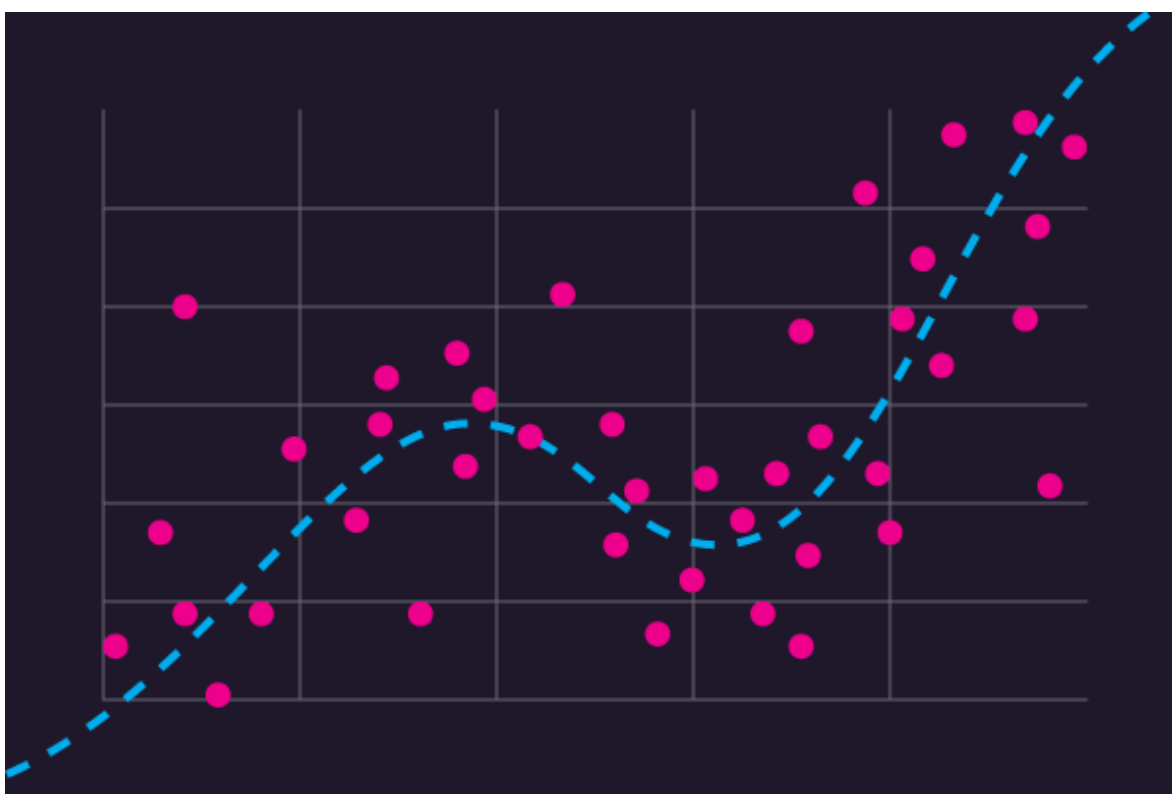




Universidad  
Católica del Norte

## MODELACIÓN Y SIMULACIÓN AVANZADA TAREA 3

### Simulación de MonteCarlo



**Estudiante:**

**Marcelo Saavedra Alcoba**  
**PROFESOR: PhD. Ranjit Das**  
**II/2022**

**QUESTION:** Genesis is a dentist who schedules all her patients for 30 minutes appointments. Some of the patients take more or less than 30 minute dependening on the type of dental work to be done. The following summary shows the various catagories of work, their probabilities and tine to complete the works.

Category	Time required	No of patients	Probability
Filling	45	40	40/60
Crown	60	15	
cleaning	15	15	
Extracting	45	10	
Check up	15	20	
<b>TOTAL</b>		<b>100</b>	

### 1) Establishing Probability distribution function

Category	Time required	No of patients	Probability
Filling	45	40	0,4
Crown	60	15	0,15
cleaning	15	15	0,15
Extracting	45	10	0,1
Check up	15	20	0,2
<b>TOTAL</b>	<b>180</b>	<b>100</b>	<b>1</b>

### 2) Estimate Cumulative distribution function

Category	Time required	No of patients	Probability	Cumulative distribution
Filling	45	40	0,4	0,4
Crown	60	15	0,15	0,55
cleaning	15	15	0,15	0,7
Extracting	45	10	0,1	0,8
Check up	15	20	0,2	1
<b>TOTAL</b>	<b>180</b>	<b>100</b>	<b>1</b>	

### 3) Setting the random number interval

Category	Time required	No of patients	Probability	Cumulative distribution	Random number interval
Filling	45	40	0,4	0,4	0-39
Crown	60	15	0,15	0,55	40-54
cleaning	15	15	0,15	0,7	55-69
Extracting	45	10	0,1	0,8	70-79
Check up	15	20	0,2	1	80-99
TOTAL	180	100	1		

### 4) Generate Random numbers

Use the following random numbers 40, 82, 11, 34, 25, 66

Llegadas Aleatorias	Estimacion de Llegadas de 30min desde las 8:00 am	Categorias	Secuencia de Tiempo	Comienzo del Servicio	Fin del Servicio	Espera de Tiempo por paciente	Tiempo Inactivo
40	08:00	Crown	60	08:00	09:00	0	0
82	08:30	Check up	15	09:00	09:15	00:30	0
11	09:00	Filling	45	09:15	10:00	00:15	0
34	09:30	Filling	45	10:00	10:45	00:30	0
25	10:00	Filling	45	10:45	11:30	00:45	0
66	10:30	Cleaning	15	11:30	11:45	01:00	0
TOTAL						03:00	

Mean time per patient  $03:00 / 6 = 00:30 \Rightarrow 30 \text{ min}$

Idle time of Dr. Genesis 0 min.