PROGRAMA A DESARROLLAR:

I- Objetivos: El curso está dirigido a Estudiantes de Doctorado y Maestría, Farmacéuticos, Bioquímicos, Licenciados en Química, Lic. en Biotecnología y egresados de carreras afines.

La Organización Mundial de la Salud (OMS) ha publicado en el año 2023 un informe sobre los agentes antibacterianos, entre ellos los antibióticos, que se encuentran en estado de desarrollo clínico y preclínico a escala mundial. Si bien el número de agentes antibacterianos en fase de desarrollo clínico se ha incrementado, se necesitan urgentemente agentes nuevos e innovadores contra las infecciones graves y para sustituir a los que han perdido eficacia debido a un uso generalizado (WHO, 2023). Esto ha motivado el desarrollo con urgencia de nuevas

estrategias terapéuticas contra enfermedades infecciosas. Por ello, el objetivo de este curso es abordar la situación actual de la problemática global de la resistencia a antimicrobianos mediante el análisis de los recientes avances en el desarrollo de compuestos con actividad antimicrobiana. Expertos en cada área disertarán sobre los nuevos enfoques en el diseño, obtención de nuevos compuestos, aplicación de la nanotecnología y el diseño de formulaciones, modelado computacional, pruebas *in vitro* e *in vivo* y estudio de los mecanismos de acción de fármacos para combatir infecciones.

II- Contenidos teóricos

Bacterias de relevancia clínica involucradas en diferentes enfermedades infecciosas.

Biofilms microbianos: Formación, patogénesis, metodologías de estudio, nuevos enfoques de tratamiento.

Resistencia a antimicrobianos. Mecanismos. Situación actual y programas de abordaje global. Concepto de “Una sola salud”.

Nuevas estrategias terapéuticas. Rol potencial de la inteligencia artificial.

Manejo de la resistencia antimicrobiana en la era de la inteligencia artificial: Conceptos básicos de inteligencia artificial (IA) y machine learning (ML) en biociencias. Principales escenarios de aplicación de IA/ML en resistencia antimicrobiana. Desarrollo de péptidos antimicrobianos con IA. Manejo de protocolos de prescripción de antimicrobianos guiados por ML. Bases de datos y recursos open source para trabajo en microbiología.

Contribución de la nanotecnología para combatir la resistencia a antibióticos.

Nanomateriales y superficies antimicrobianas: estrategias de diseño y evaluación.

Nanomateriales inteligentes: ingeniería de estrategias antimicrobianas y de detección.

Nanopartículas proteicas utilizadas en la terapia antimicrobiana.

Nanofotosensibilizadores como Alternativa Emergente en Terapia Fotodinámica.

Estrategias farmacéuticas para mejorar la actividad de fármacos antifúngicos y antileishmaniásicos.

Plataformas tecnológicas para potenciar propiedades de antimicrobianos y disminuir su impacto ambiental.

Aplicaciones de la impresión 3D en la administración de antimicrobianos y probióticos.

Terapias naturales para enfermedades olvidadas.

Panorama actual de la Terapia Fotodinámica: fotosensibilizadores, aplicaciones clínicas y nuevas estrategias científicas. Terapia Fotodinámica: fundamento, ventajas y desventajas. Fotosensibilizadores: características,

requisitos, mecanismos fotosensibilizantes. Agentes fotodinámicos usados en la clínica: generaciones, aprobados por agencias de salud. Fotosensibilizadores: desarrollos recientes, estrategias de administración y enfoques combinados para la terapia fotodinámica. Fotosensibilizadores de origen natural: avances científicos.

Estrategias en la búsqueda de productos naturales antimicrobianos. Fraccionamiento bioguiado. Derivatización de metabolitos bioactivos. Evaluación de potencial antimicrobiano fotoactivado.

Formulaciones avanzadas para enfermedades desatendidas e infecciones complejas.

Sistemas portadores de administración tópica para optimizar eficacia de antibacterianos y agentes fotosensibilizadores frente a *Pseudomonas aeruginosa* y *Staphylococcus aureus*.

Explorando la Materia Oscura Microbiana: Enfoques Genómicos y de Cultivo para el Desarrollo de Nuevos Antibióticos.

Compuestos de coordinación como estrategia para el diseño de nuevos antimicrobianos.

Terapia combinada y aductos supramoleculares: estrategias para abordar la optimización biofarmacéutica y combatir la resistencia antibacteriana.

III- Metodología de evaluación:

La evaluación consistirá en la presentación oral y crítica de trabajos de investigación publicados relacionados con los temas teóricos indicados en el programa. Serán desarrollados por grupos de alumnos (duración 3 h). Fecha: a coordinar.

IV- Bibliografía general y específica:

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