Honours topics for Semester 1, 2021

Honours project offered by School of Science

No.	Main supervisor	Co-supervisor(s)	Project title	Project description	Honours research area
1	Assoc. Prof. Adeline Ting Su Yien		Endolichenic fungi for development as biocontrol agents	Endolichenic fungi have been found to produce an array of antimicrobial compounds. These compounds may have the potential to inhibit plant pathogens, and can be developed as biocontrol agents. This project will screen for endolichenic fungi, their beneficial compounds and their role as potential biocontrol agents.	Biology (BIO), Biotechnology (BTH), Medicinal Chemistry (CHM)
2	Dr. Cheow Yuen Lin		Metal N-heterocyclic carbene (NHC) complexes as potential antimicrobial agent	The application of silver as an antimicrobial agent can be dated back to ancient times. Silver nitrate was recognized as antiseptic in wound care for more than 200 years. In the past, silver nitrate eye drops were given to newborn babies to inhibit eye infections. Following the discovery of penicillin and other new antibiotics, silver compounds have been mostly replaced. The resurgence of silver antibiotics came with the discovery of silver sulfadiazine by Fox. Silver sulfadiazine has been found to be active against numerous gram-positive and gram-negative bacteria and is marketed as a water soluble cream Silvadene Cream 1%. It remains as one of the most effective and widely used for topical burn remedy. Therefore, we would like to explore the efficiency of other types of silver compounds as antimicrobial agents. Our proposed complexes incorporate a hybrid pyridine functionalized NHC and benzimidazole moeities. We believe this project allows us to establish the structure activity relationship and is also part of the on-going effort to discover new potent antimicrobial drugs. Skills acquired: Organic and Inorganic Synthesis, Chromatography, NMR Spectroscopy, Biological Assay.	Medicinal chemistry (CHM)
3	Dr. Choo Wee Sim	Prof. Sunil Lal	Investigation of antiviral activity and its mechanistic details of betacyanin using influenza A virus as a disease model	Red dragon fruit is rich in betacyanins that give rise to its red to purplish colour. Betacyanins have been shown to possess pharmacological activities such as antioxidant, anti-cancer, anti-lipidemic, antimicrobial and antimalarial. However, most of these research were mainly carried out on betacyanins from red beetroot and prickly pear. Red dragon fruit is a promising source of betacyanins and its betacyanin composition is different from those of red beetroot and prickly pear. Betacyanin extracts from red dragon fruit has been established in our lab to possess in vitro anti-dengue and anti-influenza A viruses activities. This study further explore the mechanistic details of the anti-influenza A activity.	Medical Bioscience (MBS), Biotechnology (BTH)
4	Dr. Choo Wee Sim	Prof. Sunil Lal	The anti-inflammatory potential of betacyanin in LPS-induced RAW264.7 macrophages	Inflammation is a complex physiological defense process that protects living tissues from injurious stimulus and initiates the healing process modulated by the immune system. Macrophages, which derived from circulating blood monocytes, reside in most tissues. They are one of the critical innate immune effector cells that have impacts on inflammatory responses, tissue remodeling, repair, as well as bodily homeostasis. During inflammatory reaction, macrophages play essential roles in resistance against pathogens and inflammation resolution via the secretion of a large amounts of inflammatory mediators (e.g., NO and PGE2), ROS, and cytokines (e.g., TNF-α, IL-6 and IL-1β). This study is using the macrophages cell line to investigate anti-inflammation effects of betacyanin extracts from red dragon fruit. To achieve this goal, the study will be carried out in a model of LPS-induced inflammation in a RAW 264.7 macrophage cell line, and the action mechanisms of betacyanin extracts were investigated by monitoring the most relevant signaling pathways controlling inflammation, mitogen-activated protein kinases (MAPKs), AP-1, nuclear factor kappa-light-chain-enhancer of activated B cells (NF-κB) and Nrf2/HO-1.	Medical Bioscience (MBS), Biotechnology (BTH)

5	Assoc. Prof. Emily Goh Joo Kheng	Dr. Ang Chee Wei	Synthesis of new naphthyridine derivatives and evaluation of bioactivities and physicochemical properties	Naphthyridine represents an important bioactive scaffold that is found in many natural resources. Different derivatives of naphthyridine have been reported to possess anticancer, antimicrobial, antioxidant and anti-inflammatory activities. Some naphthyridines are also found to block β- adrenergic receptors, which can be used to treat cardiovascular diseases such as hypertension and heart failure. This project aims to develop a new series of naphthyridine to investigate the effect of structural modifications on their antioxidant, antimicrobial and physicochemical properties.	Biotechnology (BTH), Medicinal Chemistry (CHM)
6	Dr. Foo Su Chern	Dr. Choo Wee Sim	Incorporation of sustainable marine carotenoids into a food model system	Microalgae is a promising next generation sustainable feedstock poised to ensure address food security risks. In particular, the diatom Chaetoceros calcitrans manufactures an exclusive marine carotenoid, fucoxanthin that have shown to impart antioxidant (Foo et al., 2015) and anti-cancer (Foo et al., 2019) properties. The purpose of this study is to evaluate the differences in terms of (1) fucoxanthin content, (2) colour, (3) bacterial count and (4) sensory evaluation between the microencapsulated bioactive and the non-encapsulated bioactive, post incorporation. This study is available for 2 honours students with close mentoring by a HDR student.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS), Food Science and Technology (FST)
7	Dr. Foo Su Chern	Prof Chan Eng Seng (SoE)	Stabilization of lutein extracted from Chlorella sorokiniana_MUM002 by microencapsulation in Pickering emulsions	Recently, my research group isolated and characterized a tropical microalgal species, Chlorella sorokiniana_MUM002, which exhibits high growth rate and high lipid content. The lipid was found to contain lutein, a form of carotene that confers numerous health benefits when consumed such as prevention of macular degeneration. However like all carotenoids, lutein is highly susceptible to oxidative degradation. Therefore, there is a need to improve the stability of lutein during processing and handling in order to maintain its efficacy upon consumption. Microencapsulation is one the strategies that can be adopted to improve the stability of lutein. Recently, Monash Engineering has been pioneering a method to encapsulate degradation-prone lipid compounds in solid-stabilized emulsions (also called 'Pickering emulsions'). Pickering emulsions have amassed tremendous research interest owing to its “surfactant-free” characteristic. The deposition of solid particles on the dispersed lipid droplets containing lutein is hypothesized to provide a physical barrier that could confer a remarkable stability against oxidation. In this work, we aim to evaluate the oxidative stability of lutein contained in Pickering emulsions stabilized by three different types of solid particles: nano-crystalline cellulose (NCC), chitosan nanoparticles and hydrophobic starch. The physicochemical properties of the emulsions formed will be evaluated and the retention of lutein during emulsification and storage will be examined. Specific objectives of the project: 1. To investigate the effect of Pickering emulsifiers and their concentration on the physicochemical properties and stability of the emulsions formed 2. To study the retention of lutein during emulsification and storage	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS), Food Science and Technology (FST)

8	Dr. Holly Barclay		Distribution of endangered and endemic peat swamp fishes in human-modified landscapes of Selangor, Malaysia	Peat swamp forests are home to an estimated 10% of freshwater fish species in Peninsular Malaysia, including a number of critically endangered and endemic species. Currently many peat swamp habitats are undergoing land conversion to agriculture (e.g. oil palm) or to make way for housing developments. This project will use field surveys and collection of aquatic environmental data (e.g. water levels, water chemistry) to assess whether modified peat swamp habitats (primarily oil palm drainage channels) are able to provide a suitable environment for peat swamp fish species, with an emphasis on endangered and endemic species. The results of this study will provide valuable information about the extent to which these fishes can be conserved in agricultural areas under the right management conditions vs. the necessity for new protected areas to conserve these species in their natural habitats. The results of this project will therefore be of value to the conservation of freshwater fishes in Malaysia, and will be shared with relevant local conservation NGOs.	Biology (BIO)
9	Dr. Holly Barclay	Prof. Sadequr Rahman	Biodiversity of fishes in Tasek Bera: A comparison of environmental DNA and traditional survey methods	Tasek Bera is Malaysia's largest natural freshwater lake, composed of a mosaic of freshwater habitats including peat swamp forest, freshwater swamp forest, Pandanus scrub and open water. Tasek Bera is recognised as a wetland of international importance for biodiversity under the Ramsar Convention. Environmental DNA (eDNA) is genetic material extracted from environmental samples such as soil or water. Protocols for extracting and analysing eDNA samples from aquatic environments have been developed for a range of aquatic taxa, including fishes, molluscs and amphibians. However, currently there are few published studies which have tested the potential for aquatic biodiversity monitoring in the tropics The aim of this study is to trial the use of eDNA for biodiversity monitoring of fish species in Tasek Bera. We will compare fish community composition in at least two habitat types within Tasek Bera using traditional surveys (cast nets, dip nets) and water sampling to extract eDNA. This project will generate data about the extent to which different habitat types within Tasek Bera support different fish communities, as well as testing a novel survey methodology for quantifying fish biodiversity in tropical aquatic ecosystems.	Biology (BIO)
10	Dr. Irene Ling	Dr Lim Siew Huah (UM)	Synthesis of functional ionic liquids	The unfortunate negative side effects from the environmental unfriendly chemicals have impacted the globe. Efforts are underway to develop cleaner and efficient solvents including substituting solventless reaction medium in chemical processes (crucial in refineries and petrochemicals industries). This project is intended to introduce a series of functional ionic liquids through modification of commercial ones via simple and safe chemical process. The work involves organic synthesis and basic material characterization & analyses.	Medicinal chemistry CHM, Food Science and Technology (FST), Biotechnology (BTH)
11	Dr. Irene Ling	Dr Lim Siew Huah (UM), Dr Shahrul Ainliah (UPM)	Molecular sensors for anionic species	There is a growing interest in designing molecular sensors for anionic species driven by the substantial role of anions in biology and industrial processes and the need to develop new materials for sensing anionic environmental pollutants. The objective of this project is to synthesize a series of variable counterions with di-substituted cationic sensors and to examine the physical and chemical properties of these compounds after ion exchange. Further to this work, the compounds will be tested for sensing capability.	Medicinal chemistry CHM, Food Science and Technology (FST), Biotechnology (BTH)
12	Dr. Irene Ling	Dr Mohd Haniff Wahid (UPM)	Modification of nanofiber mat for pollutant extraction	Water pollution is a major issue today owing to the intensified industrialization. This widespread issue is affecting human health and aquatic system. This project aims to prepare an improvised version of existing nanofiber mat for better capability and selectivity to trap water pollutants.	Medicinal chemistry CHM, Biotechnology (BTH)
13	Dr. Ken Yeong		Sulfonamide-based theranostics	Sulfonamides are a class of antibiotics that has found new applications in many biological processes. It is also class of electron donors that can be incorporated into various fluorophores. This project aims to develop novel sulfonamides as theranostics where the diagnostic and therapeutic ability can be combined into a single molecule.	Medicinal Chemistry (CHM)

14	Dr. Ken Yeong	A/P Lim Yau Yan, Dr Ang Chee Wei	Design and development of novel metal-based antimicrobials	Traditional antibiotics tend to act on specific biochemical processes which provide ease of progressive resistance. Alternatively, metals appear to target multiple cellular processes which could potentially reduce the chances of developing resistance. This project aims to develop novel metal-based antimicrobials (MBAs) using the sustainable chemistry approaches.	Medicinal Chemistry (CHM)
15	Dr. Ken Yeong	Dr Patrick Tan	Repurposing neuropeptides as antimicrobial agent.	Amyloid beta aggregation has long been touted as one of the hallmarks of Alzheimer's disease. Recent reported cross-talk between neurological disorders and gut microbiome has led to the investigation of the basic function of amyloid beta in the brain. It has been shown that these peptides are capable to bind microbes. The aim of this project is to evaluate the potential of amyloid beta peptide as an antimicrobial agent. The active fragment of the peptide will subsequently be identified.	Medicinal Chemistry (CHM), Medical Bioscience (MBS)
16	Dr. Ken Yeong	Dr Tang Kim San (Pharmacy)	The protective role of essential oils in diabetic-related complications	Diabetes is a chronic condition associated with abnormally high levels of blood sugar. Diabetes is caused by the absence or insufficient production of insulin, or an inability of the body to properly use insulin. Damages to kidneys and nervous tissues are common complications in diabetes. Oxidative stress plays a major role in the pathogenesis of diabetes and the development of these complications. Essential oils are concentrated hydrophobic liquids extracted from plant tissues that contain volatile aroma compounds. Some essential oils possess high antioxidant activity and thus may counteract the oxidative stress in diabetes. Nonetheless, the ability of these oils to protect against diabetic-related tissue damages is largely unclear. The aim of this project is to evaluate the protective potential of different essential oils in cell models of diabetic nephropathy and neuropathy.	Medical Bioscience (MBS)
17	Dr. Ken Yeong	Dr Yasodha Sivasothy (Pharmacy)	Essential Oils as Potential Treatment Strategy for Alzheimer's Disease	The inhibition of the cholinesterase enzymes (acetylcholinesterase, AChE and butrylcholinesterase, BChE), the enzymes known to catalyse the hydrolysis of neurotransmitters in the brain, is an important strategy in the management and treatment of Alzheimer's Disease (AD). Recently, essential oils from edible plants have become of great interest in the treatment strategy of AD due to their availability, affordability, as well as their biodegradability. With regard to this, the aim of the current project would be to isolate essential oils from selected edible plants, analyse their chemical composition and screen their AChE and BChE inhibitory activities in search of natural dual-target enzyme inhibitors.	Medicinal Chemistry (CHM), Medical Bioscience (MBS)
18	Dr. Ken Yeong	Dr Khaw Kooi Yeong (Pharmacy)	Semisynthesis of Zingerone from Zingiber officinale Roscoe and their biological evaluation as potential neuroprotective agent.	Zingerone is one of the major bioactive constituents of ginger (Zingiber officinale Roscoe, Zingiberaceae) rhizomes, a plant used worldwide as a spice and flavouring agent. It has been reported to display diverse pharmacological properties including antioxidant, anti-inflammatory properties and inhibition on oxidative stress, with its enone moiety being essential for these activities. It is hypothesized that by incorporating selected structural motifs taken from established anti-Alzheimer drugs into the scaffold, new anticholinesterase agents that are able to modulate several mechanisms responsible for the progression of Alzheimer's disease (AD) may be uncovered.	Medicinal Chemistry (CHM)
19	Dr. Lee Yee Ying		Development of Oil-in-Water Beverage Emulsion Stabilised by Okra Mucilage	Okra or commonly known as lady's fingers contains thick and slimy material called mucilage that is made up of polysaccharide. As a polysaccharide, it can act as a source of dietary fiber that increases the feeling of satiety and slows down stomach emptying. Attributed to its thick viscosity, mucilage of okra can also be utilised as a natural polysaccharide-based emulsifier or stabiliser to stabilise the food emulsion system. Currently, polysaccharide based stabiliser has received tremendous interest from the industry as a move to create a clean label product. Looking at the benefical effects, functional properties and the abundancy of okra in Malaysia, the present research work aims to investigate the extraction of mucilage from the underutilized okra and further evaluate its capability and possibility in stabilising oil-in-water beverage emulsion such as coconut milk emulsion.	Food Science and Technology (FST)

20	Dr. Lee Yee Ying		Development of Beef Fat Replacer for Preparation of a Healthier Choice Beef Patties	In recent years, consumer is skeptical about the consumption of meat and meat product because of its high saturated fat content that is often associated with several metabolic diseases. Meat industry is on the search of fat replacer with a healthier lipid profile and lower calorific value to produce meat products with better nutritional properties. Seed oil processing generated a tremendous amount of the underutilised seed meal that is rich in protein and majority of the seed meal is underutilised. Hence, the ultimate goal of this project is to explore the potential of utilising the seed meal for the development of healthier choice fat replacer before further evaluating the physical and chemical properties of the into beef patties substituted with the seed meal fat replacer.	Food Science and Technology (FST)
21	Dr. Lee Yee Ying	Nur Azwani Ab Karim (Sime Darby Sdn Bhd)	Synthesis of Medium-and Long-Chain Triayclglycerol Functional Oil for the Preparation of Healthful Mayonnaise	Medium-and long-chain triacylglycerol is a type of structured lipid having medium-chain and long-chain fatty acid attached to it. Consumption of medium and long-chain triacylglycerol was claimed to be able to reduce body fat accumulation in the body which is essential to manage obesity. Besides, omega-3 fatty acid like EPA and DHA was highly recognized for its abilty to modulate inflammation and hypertriglyceridemia. Interestingly Malaysia is one of the largest palm oil producers in the world. Through the palm oil processing, tremendous amount of palm and palm kernel oil fractions are generated and many of which are underutilised to produce value-added products. Looking at the chemical composition of these fractions and the beneficial health effect of medium-and long-chain triacylglycerol as well as omega-3 fatty acid, the project aims to develop medium-and long-chain triacylglycerol structured lipid enriched with omega 3 fatty acid before further evaluate the mayonnaise prepared from such functional oil.	Food Science and Technology (FST), Biotechnology (BTH)
22	Dr. Lee Yee Ying		A Green Approach in Concentrating Carotenoids from Crude Palm Oil	Carotenoids are a class of phytonutrients that is responsible for bright red, yellow, and orange colour. It is a potent antioxidant used to modulate various types of health complications. Among the various plant species, carotenoids are found abundantly in crude palm oil (unrefined palm oil). Usually, the carotenoids from palm are commercially extracted using sophisticated and costly equipment. Hence, this project aims to employ a mild, green, and sustainable dry fractionation approach to concentrate carotenoids from crude palm oil without using chemical solvent that can be used in various applications.	Food Science and Technology (FST)
23	Dr. Lee Yee Ying		Development of Coconut Milk Substitute Powder Enriched with Palm-based Phytonutrient	Nondairy beverages, particularly coconut milk has received a lot of attention to be used in beverage drinks or drink as it is. Nondairy beverages from plant sources are unique that they are suitable for vegan and lactose intolerance individuals. Malaysia is one of the largest palm oil-producing countries in the world. For the last few decades, palm oil and palm kernel oil has remained as one of the important commodities to drive the growth of Malaysia's economy. Looking at the chemical make-up of the palm fractions which resemble that of the coconut oil, its phytonutrient content and its current condition that is left underutilized, the present study aims to develop powdered palm-based coconut milk substitute enriched with phytonutrient. The project will investigate the effect of different types of encapsulating agent on the stability of phytonutrient enriched emulsion before further converting them into powdered coconut milk substitute	Food Science and Technology (FST)
24	Dr. Lee Yee Ying	Dr. Michelle Yap	Development of Cookies Enriched with Plant-based Protein Extracted from Palm Biomass	Plant-based protein received wide attention from the public recently as an alternative to animal protein. Plant-based protein is readily available and has an almost similar amino acid profile as compared to animal protein. Further, they are regarded as halal/Kosher and suitable for the public. Interestingly, palm oil processing is a well-established industry in Malaysia. As the largest palm oil producer in the world, Malaysia produces around million tonnes of biomass. Seeing the availability of palm biomass in such a large portion and the valuable protein content in it, it is ought to be utilized for human being application. The project will investigate the isolation of protein from palm biomass and subsequently investigate the effect of such protein in the development of cookies.	Food Science and Technology (FST)

25	Dr. Lee Yee Ying	Dr. Lee Sin Yee	Synthesis of Medium-and Long-Chain Triayclglycerol Functional Oil Via Supercritical Carbon Dioxide	Medium-and long-chain triacylglycerol is a type of structured lipid composing of medium-chain and long-chain fatty acid attached to it. Consumption of medium and long-chain triacylglycerol was able to reduce body fat accumulation in the body which is essential to manage obesity. Conventionally, medium-and long-chain triacylglycerol is synthesised under normal condition via interesterification, esterification, and acidolysis reaction. However, such a conventional approach may lead to a lesser yield of MLCT. Hence, in this project, supercritical carbon dioxide will be used to intensify the production of structured lipid medium-and long-chain triacylglycerol.	Food Science and Technology (FST), Biotechnology (BTH)
26	Assoc. Prof. Lim Yau Yan		Chemical analysis of porcupine dates	Porcupine dates, another type of medicinal bezoar stones, are composite of plant-derived phytobezoars formed in the gastrointestinal lining of Himalayan porcupine, Hystrix brachyura. These bezoars are well known among Asian Chinese for their claimed effectiveness in treating inflammation, dengue fever, and acute pain, and many believed that these bezoars could treat cancers. The types of porcupine bezoars and their properties were recently reviewed and some pharmaceutical properties of porcupine dates have been investigated in my research lab and the results published. Although the active ingradient has been found to be tannic acids, the other chemical components such as heavy metals, amino acids profile, etc have not been explored. Through this project the student will learn various analysis techniques such as HPLC, AAS, LC-MS, etc.	Medicinal Chemistry (CHM), Food Science and Technology (FST), Biotechnology (BTH)
27	Assoc. Prof. Lim Yau Yan	Dr Yeong Keng Yoon	Anticholinesterase activity of Coctus Woodsonii	Costus woodsonii Maas of the Costaceae family, commonly called red button ginger or scarlet spiral flag, is a monocot, herbaceous, with creeping rhizome. The plant is native to Central America, but can be found throughout the tropics in all continents including Malaysia. The plant's bioactivity properties (antioxidant, antibacterial and anticancer) as well as chemical constituents have been investigated in our research lab in the past three years. In addition preliminary screening of the methanolic extracts of different parts of plant showed good cholinesterase inhibitory activity, which could potentially be utilized for therapeutic application in reatment of Alzheimer's disease.The aim of the project is identify and isolate the compound(s) that is responsible for the activity.	Medicinal Chemistry (CHM), Food Science and Technology (FST)
28	Assoc. Prof. Lim Yau Yan		Antioxidant properties of Brazilian spinach	Brazilian spinach", "Bayam Brazil" (in Indonesian), is a tropical edible groundcover of the genus Alternanthera used as a leaf vegetable. Although it is referred to scientifically as Alternanthera sissoohort, there are no known scientific descriptions of its taxonomy. Reportedly, Brazilians usually eat it raw in salads with oil and or vinegar, tomato, and onion, although the literature recommends cooking it. It can be added to added to dishes and stir-fries late in the cooking process as a spinach substitute and to add a nutty flavour. To date the antioxidant activity of the leaves has not been reported and not much phytchemical information obtained from such study. This project aims to carry out a detailed and in-depth study of its antioxidant activity. Extraction, Uv-Vis and HPLC techniques will be used in this project. A research paper is expected to come out from this work.	Medicinal Chemistry (CHM), Food Science and Technology (FST)
29	Assoc. Prof. Lim Yau Yan		Effects of lighting conditions on nutritional properties of herbal plants	Photobiological research has become an area of increasing interest since the introduction of light-emitting diodes which have the potential to cover intensity and specific wavelength requirements of different phases of plants growth and thus affecting the biomass and metabolic products of cultivated plants. In the past decade, most research work has been done on culinary and medicinal herbs under controlled monochromatic red or blue light condition and few studies on the different ratios of combined red and blue have been reported. The main aim of this project is to investigate effects of different proportions of red, blue, green and far-red light on the tropical herbal plants. Changes in antioxidant, chlorophyll, carbohydrate contents as well as bioactivity will be determined.	Biotechnology (BTH), Medicinal Chemistry (CHM), Food Science and Technology (FST)

30	Dr. Md Zobaer Hasan		Influence of demographic variables on the spread of COVID-19 in Malaysia	This study will use the qualitative analysis to investigate whether there is an association between the demographic variables and the effected groups of COVID-19 in Malaysia. It will also use the quantitative analysis to examine whether there is any significant difference in the mean effected number of COVID-19 cases across the different levels of demographical variables in Malaysia.	Medical Bioscience (MBS)
31	Dr. Md Zobaer Hasan		Investigate the socio-economic factors of the coronavirus disease in Malaysia	In this research, we will apply the quantitative as well as qualitative techniques to investigate the socio-economic factors (occupation, education, income, wealth and living place) of the coronavirus disease in Malaysia.	Medical Bioscience (MBS)
32	Dr. Md Zobaer Hasan		Role of meteorological variables in COVID-19 transmission: A case study from a tropical country, Malaysia	In this research, we will examine the correlation between COVID-19 transmission and meteorological variables (average temperature, average humidity, and average wind speed) to highlight significant meteorological variables in relation to COVID-19 transmission in Malaysia.	Medical Bioscience (MBS)
33	Dr. Md Zobaer Hasan		Knowledge, attitude, and practices towards COVID-19 among elderly population in Malaysia	Peoples' adherence to the guidelines and measures suggested in fighting the ongoing COVID-19 pandemic is partly determined by the Knowledge, Attitude, and Practices (KAP) of the population. In this cross-sectional study, we will try to focus the current COVID-19 related knowledge, attitudes, and practices of elderly population in Malaysia.	Medical Bioscience (MBS)
34	Dr. Md Zobaer Hasan		COVID-19 related knowledge, attitudes, and practices among university students in Malaysia	University students have always their own valuable knowledge and attitudes as well as different practices on any ongoing issues. In this cross-sectional research, we will try to understand the current COVID-19 related knowledge, attitudes, and practices of university students in Malaysia.	Medical Bioscience (MBS)
35	Dr. Md Zobaer Hasan		COVID-19 related stress on university students and its effects on their academic performance	This study will examine the impact of COVID-19 on university students in Malaysia. The mainobjectives are to identify the extent to which stress affects students' academic performance, health and general lifestyle. A quantitative method will be used in gathering and analysing the data.	Medical Bioscience (MBS)
36	Dr. Md Zobaer Hasan		Study the impact of COVID-19 on childhood health and malnutrition in Selangor state of Malaysia	The outcome of malnutrition is severe and a big problem to the world. It results in the shortage in physical growth, mental progress and failure to resist disease. Since the COVID-19 pandemic across the world, many actions have been executed to control the disease. And, such actions may have serious impact on child health and development in many countries such as countries in Southeast Asia. The project aims to carry out a critical analysis of the childhood health and malnutrition outcome in the Selangor state of Malaysia in response to the COVID-19 effects.	Medical Bioscience (MBS)
37	Dr. Md Zobaer Hasan		Relation between different types of MCOs and COVID-19 infections in Malaysia	Malaysia reported its first COVID-19 positive case on January 25, 2020. As of October 5, the Southeast Asian country has recorded a total of 12813 cases, with 137 deaths. This study will try to investigate the significant relation of different types of MCOs (MCO, CMCO and RMCO) with the COVID-19 infections in Malaysia.	Medical Bioscience (MBS)

38	Dr. Md Zobaer Hasan	Dr. Ken Yeong Keng Yoon	Perception and Practice of Traditional and Complementary Medicine (T&CM) among Malaysian: A Cross-sectional Statistical Comparison between Rural Area and Urban Area of Selangor State in Malaysia	Due to availability and low cost, people especially in developing countries in the world like to use traditional and complementary medicine (T&CM). The objective of the study is to explore the type of T&CM available in Malaysia as well as to find out the associated factors of interest to use T&CM. For fulfil the purpose, data will be collected by interviewed rural and urban people of Selangor state which is the largest state in Malaysia in terms of total population. The study will help to understand the reason behind use of T&CM and recommend to prepare regulation guideline for marketing and use.	Medical Bioscience (MBS)
39	Dr. Michelle Yap		Characterisation of epitope properties and neutralising antibodies of venom cytotoxin	Cytotoxin is the principle toxin component of cobra venoms and it is responsible for dermonecrosis. Dermonecrosis causes serious permanent disability in the affected victims due to amputations, deformities and contracture. The current immunotherapy is ineffective against dermonecrosis due to its low immunogenicity and multitude of different isoforms. Our preliminary findings revealed the epitope sites of cytotoxin are situated at its functional site. In this project, we aim to purify the peptide sequences correspond to its epitope sites and examine the neutralizing potency of a monoclonal antibody against the epitope sequences of the toxin. The findings are expected to provide insights for further development of toxin-targeted immunotherapeutic protocol.	Medical Bioscience (MBS), Biotechnology (BTH)
40	Dr. Michelle Yap	Prof Sunil Lal	Molecular interaction of host proteins and influenza A virus nucleoprotein via *in silico* and experimental approach	Influenza A virus (IAV) is a negative-sense RNA virus. The IAV nucleoprotein functions to encapsulate genomic viral RNA to form the vRNP complex for viral replication and transcription. It plays a significant role as an interacting partner with the host proteins in IAV life cycle. In this study, an in silico molecular study of IAV NP with host proteins will be determined to elucidate the proximity of the interaction. This is later confirmed by experimental proteomic analyses of the interaction.	Medical Bioscience (MBS)
41	Dr. Patrick Tan	Dr. Ken Yeong Keng Yoon	Aptabiotics - engineering DNA aptamers as bacterial cell-penetrating agents	In the two last decades, many pathogens have acquired resistance to various antibiotics, prompting the World Health Organization to publish a list of pathogens which urgently need new antibiotics. DNA aptamers are DNA molecules that are capable of catalysing biological reactions analogous to proteins. They have been widely explored for their diverse range of catalytic activities in various biomedical applications. The aim of this project is to develop new DNA molecules that are capable of penetrating the bacterial cell membrane. The aptamers will be screened for cell-penetrating capabilities and antimicrobial activities through systematic evolution of ligands by exponential enrichment (SELEX). The student will explore various molecular biology, microbiology and organic chemistry techniques in this project.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS) , Medicinal Chemistry (CHM)
42	Dr. Patrick Tan		Designing aptamers as a novel diagnostic agent against Acinetobacter baumanii	Acinetobacter baumannii is an opportunistic bacterial pathogen primarily associated with hospital-acquired infections. It has acquired multiple drug-resistant genes and is currently the number one pathogen in the WHO list of antimicrobial-resistant bacteria. Aptamers are short, single-stranded DNA or RNA oligonucleotide biosensors that can interact with a wide variety of analyte targets with high affinity and specificity. In contrast to antibodies, aptamers have low toxicity, are stable over a wide temperature and pH range, and are the products of simple and reproducible chemical syntheses. The aim of this project is to screen for new DNA aptamers that can selectively identify A. baumannii from other Acinetobacter species. These aptamers can potentially be integrated into detection kits such to allow rapid diagnostic of A. baumannii at point-of-care. This project will explore the field of nucleic acid chemistry, recombinant DNA technology and employs various microbiology techniques.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS), Medicinal Chemistry (CHM)

43	Dr. Patrick Tan		Characterisation of antimicrobial peptide against Acinetobacter baumannii	Acinetobacter baumannii is an opportunistic bacterial pathogen primarily associated with hospital-acquired infections. It has acquired multiple drug-resistant genes and is currently the number one pathogen in the WHO list of antimicrobial-resistant bacteria. The aim of this project is to investigate the effects of predicted antimicrobial peptides (AMPs) against A. baumannii. These AMPs can be viable alternatives to antibiotics. This project will explore the field of recombinant DNA technology, proteomics, microbiology techniques, and possibly an insect model.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)
44	Dr. Patrick Tan	Prof. Sunil Lal	Gene expression profiling of the PABC1 related pathways and their modulation by IAV	Influenza A virus (IAV) is currently an infectious disease that has caused many outbreaks in birds, swine and human flu. Nucleoprotein (NP) is a major viral protein that plays critical role during IAV replication. NPs interacts with many host proteins in to regulate expression of viral RNA. This project will study the gene expression profile of PABC1, one of the interacting partners of NP. You will explore techniques in molecular biology and virology.	Biotechnology (BTH), Medical Bioscience (MBS)
45	Dr. Pushpamalar Janarthanan	A/P Wu Ta Yong (School of Engineering)	Development of novel biodegradable membrane from oil palm biomass for daily use materials	Malaysians are, on average, notorious for generating massive amounts of non-degradable used material waste, such as bags and food packaging. As an approach to implement environmentally friendly industries, the conversion of plant waste into useful products has been one of the most important innovations in recent years. In Malaysia, oil palm waste has received considerable demand as a source of chemical feedstock due to their high abundance, renewability, biodegradation and low cost of production. In this study, oil palm empty fruit bunch (OPEFB) is being used to isolate oil palm pulp (cellulose) and further modified to furan dicarboxylic acid (FDCA) that can be manipulated easily to produce membranes for producing biodegradable materials.	Biotechnology (BTH)
46	Dr. Pushpamalar Janarthanan	A/P Kumaran (SoS) /A/P Pooria (School of Engineering)	Farmer-friendly and cost-effective handheld vaccine and growth supplements beads delivery system for poultry industry	Currently, worldwide, the chicks are spray-vaccinated whereby the spray droplets adhere on the chick's feather which leads to an uneven distribution of the vaccine. The polysaccharide based-bead vaccine technology as a practical vaccine delivery system is challenging in administering beads that can confer immunity against subsequent episodes of coccidiosis. In this work, we propose to develop a highly efficient with increased stability vaccine and mineral supplement bilayer beads instantly prepared with a hand-held point of the feeding device. The polymer made from plant biomass are environment-friendly and reduce waste that hinders the environment pollution. This device and the polymer beads could be commercialized in Malaysia and globally to improve food security. This instance way of preparing bilayer beads with active agents will be an nnovative way of vaccine and supplement dissemination in poultry industry.	Biotechnology (BTH)
47	Dr. Pushpamalar Janarthanan	Dr. Alice Chuah Lay Hong (School of Pharmacy)	Developing of control release system for anticancer drugs	The interest in controlled release technology for oral drug delivery is largely driven by the prospect of increasing the efficacy of medicine with reduced side effects, maximizing patient compliance and good methods of approaching the management of the disease. The advantages of oral drug administration can be enhanced if the dosage form can be presented in a way that offers a reduction in the dose frequency or can be used to target a particular section of the gastro-intestinal tract (stomach, small intestine, and colon). The anticancer drug can be loaded into carboxymethylcellulose (CMC) or mixture of polysaccharides such as psyllium husk, chitosan, gelatin and pectin hydrogels that incorporated with ferric nanoparticle or graphene oxide, which consists of many pores and shaped into beads/tablets, which will disintegrate by biodegradation to release the drug. The control release pattern will be studied.	Medical Bioscience (MBS)

48	Dr. Pushpamalar Janarthanan	Dr Thenapakiam (MIPO)	Developing of Carboxymethylcellulose (CMC) polymer coated with modified magnetic iron oxide (Fe_3O_4) nanoparticles for metal ions and dye removal.	The nano-enhanced polymeric membrane was prepared by addition of different types of modified iron oxide nanoparticles. Fe_3O_4 nanoparticles were coated by silica, metformin and amine, and then subjected to form matrix membranes. The prepared membranes were characterized by morphology (FESEM and AFM images), hydrophilicity, and sizes of the pores, pure water flux, and metal ions removal. Subjecting appropriate organic/inorganic modifiers for inorganic nanoparticles like iron oxide could promote removal of metal ions and dyes.	Biotechnology (BTH)
49	Dr. Pushpamalar Janarthanan		Green biosynthesis of silver nanoparticles using plant extract and investigate the antimicrobial properties	Green biological synthesis of metallic nanoparticles is an important method in improved techniques of eco-friendly nanoparticles production. Silver nanoparticles have been widely used during the past few years in various applications due to their well-known effectiveness in biomedical, electronic, catalysis and optical applications. The outstanding antimicrobial properties of Ag-NPs have led to the development of a wide variety of nanosilver products, including nanosilver-coated wound dressings, contraceptive devices, surgical instruments, and implants. Apart from these antimicrobial activities, Ag-NPs are also known to possess antifungal, anti-inflammatory and antiviral properties. Additionally, more recent developments have seen Ag-NPs used in room spray, wallpaper gloves, laundry detergent, and wall paint formulations as well as in the textile industry for clothing manufacturing. Moreover, the biologically active molecules involved in plant extracts are well-known as the functional food for their richness in lipids, minerals, and certain vitamins, and also several bioactive substances like polysaccharides, proteins, and polyphones, with potential medicinal uses. Thus, their phytochemicals include hydroxyl, carboxyl, and amino functional groups, which can serve both as effective metal-reducing agents and as capping agents to provide a robust coating on the metal nanoparticles in a single step.	Biotechnology (BTH)
50	Dr. Pushpamalar Janarthanan	Prof Phil Andrew (School of Chemistry,MUA), Dr Thenapakiam (MIPO)	Developing methods for the incorporation of bismuth into functionalised carboxymethylcellulose hydrogels and subsequent assessment against a range of multi-drug resistant bacteria	Bismuth compounds are well known for antimicrobial activity, especially in assisting the treatment and eradication of Helicobacter pylori. The current approved medical treatments for H. pylori infection as part of quadruple treatment regimens is with bismuth subsalicylate or colloidal bismuth subcitrate (MIC ~34.5 μM) – both derived from carboxylic acids. Metal-based antibiotics are not new and those based on silver still attract much attention; both as metal-organic compounds (eg silver sulphadiazine) and more recently as nanoparticles (AgNPs). However, there are significant problems; environmental contamination and persistence, human toxicity, and emerging resistance have all been identified as future limiting factors which may lead to greater regulation. Hydrogels have become extremely popular in a multitude of applications in modern medicine and beyond, owing largely due to their properties as biocompatible, soft, malleable and high water content materials. Carboxymethylcellulose (CMC) is an ether derivative cellulose in which H atoms of the hydroxyl groups are being replaced by carboxymethyl groups ($-CH_2COOH$). Moreover, CMC is known to have a high transparency and mechanical strength, good water solubility as well as excellent hydrogel-forming property. We have selected carboxymethylcellulose as natural polymers are favoured over synthetic polymers as they offer several advantages such as biodegradable, modifiable, renewable, biocompatible and non-toxic. This joing project will develop protocols for the inclusion of known antimicrobial bismuth-based moieties into sulfonated-carboxymethylcellulose at low %Bi loadings (0.5 – 5.0 %) to manufacture an antimicrobial hydrogel. The ultimate aim of preparing bismuth containing sulfonated-carboxymethylcellulose is to study on the biocompatibility characteristic towards healthy cells to be able to employ this material as an antibacterial agent for treatment of Helicobacter pylori, or alternatively as a drug carrier.	Biotechnology (BTH)

51	Dr. Pushpamalar Janarthanan	A/P Pooria (School of Engineering)/ Dr. Alice Chuah Lay Hong (School of Pharmacy)	Developing of control release transdermal patch for drug delivery system by electrospinning	Electrospinning is a technique to transform polymer solutions (hydrophobic/hydrophilic) to non-woven fibrous membranes with fiber diameter as small as to the nanometer range. Membranes produced exhibits high surface/volume ratio, enhanced mechanical strengths, and highly open porous structures. A typical setup for electrospinning consists of a syringe loaded with dissolved polymer solution, a needle, a power supply which forms the negative and positive terminals, and a collector. Electrospun membranes can be applied for various purposes such as water filtration, drug delivery carriers, and scaffolding. In the field of electrospun fiber membranes for drug delivery carriers, the most common hindrance to a sustained drug release is the initial burst release of loaded drugs due to the degradation of the membranes and the diffusion of surface drugs. A combination of hydrophobic and hydrophilic polymer membranes could be expected to result in a good biocompatibility and able to delay in vitro hydrolysis due to its intrinsic water repellent capabilities.	Medical Bioscience (MBS)
52	Dr. Pushpamalar Janarthanan	Dr Pushpamalar Janarthanan/ A/P Pooria (School of Engineering)/ Dr. Alice Chuah Lay Hong (School of Pharmacy)	Developing of control release microcapsules for drug delivery system by electrospraying	Spray drying has widely used the method in the pharmaceutical industry to prepare microcapsules for loading and administration of various biomedical drugs. In the electro-spraying technique, the dissolved polymer/s is homogenized under high-speed and sprayed with high power to result in atomization that leads to the formation of the small droplets or the fine mist from which the solvent evaporate instantaneously leading the formation of the microspheres in a size range 1-100µm. Fibre polymer materials such as plant gums, modified celluloses and dextrins can all be used as the components of an encapsulant matrix. Spray-drying microencapsulation can both protect the drug from environmental pressures as well as mask the unpleasant taste of drugs through the encapsulant physical barrier. Cytotoxic drugs could be encapsulated until it reaches to the targeted sites and drugs molecules are being released without harming the normal cells along the gastrointestinal passages.	Medical Bioscience (MBS)
53	Assoc. Prof. Qasim Ayub	Dr. Patrick Tan	Sewage waste water screening for COVID-19: Apublic health initiative.	This will be a pilot study for environmental surveillance of sewage waste as a public health measure to control spread of COVID-19. Environmental surveillance of sewage has proven to be a sensitive screening technique for polio eradication and has been used to detect outbreaks of norovirus, antibiotic-resistant bacteria, measles and more recently SARS-CoV-2, the causitive agent for COVID -19. We propose to analyze sewage wastewater for presence of SARS-CoV-2 virus to supplement individual diagnostic testing and as a long term public health surveillance management tool to track and control the spread of COVID-19. The study will be focussed in Selangor and involve external industry collaborators who will assist in sample collection.	Biotechnology (BTH), Medical Bioscience (MBS)
54	Assoc. Prof. Qasim Ayub		Extracting high molecular weight DNA for long read sequencing from diverse eukaryotic sources.	The genomics facility has been awarded a strategic funding to offer PacBio sequencing as part of the Malaysian BioGenome Project, that aims to generate reference genome sequences for vertebrates and other eukaryotic species. To obtain high quality sequences using this technology requires high molecular weight input genomic DNA. The student will explore a variety of DNA extraction techniques and optimize the extraction process from a variety of fungal, microalgae and vertebrate species. Time permitting they will sequence one indigenous species or isolate on the new PacBio Sequel II system and assemble a high quality reference genome from scratch.	Biotechnology (BTH)

55	Assoc. Prof. Qasim Ayub	Dr. Chong Chun Wie	Examining amylase gene copy number variation and oral microbiome in the Segamat population.	The amylase enzyme is secreted by the salivary gland and aids in starch digestion. Humans who consume more starch have more copies of the salivary amylase gene that range from 2-15 across various human populations. Gene copy number variation in this enzyme have been correlated with a diet rich in starches. In the proposed project the student will examine amylase gene copy number variation in the Segamat population collected under the auspices of The South East Asia Community Observatory (SEACO), a Monash University Malaysia's research platform in population health and well being in Malaysia. These populations are currently being analysed at Monash University Malaysia as part of the Malaysian Microbiome Project. The population includes all four diverse ethnicities (Malay, Chinese, Indian and Orang Asli) that reside in Malaysia. The student will analyse gene copy number by quantitative amplification of human genomic DNA extracted from saliva and will examine the correlation of the amylase gene copy number variation with their diet and oral microbial profile.	Medical Bioscience (MBS)
56	Assoc. Prof. Qasim Ayub	Prof. Ishwar Singh Parhar	Mitochondrial phylogeography of mahseers in the ASEAN region.	This project aims to sequence complete mitochondrial sequences from mahseers fish belonging to the genera Tor. These fish are commonly found throughout the ASEAN region and are under threat due to over fishing. The project will use targeted resequencing of amplified mitochondrial DNA using high throughput genomic sequencing to understand the genetic relationships between the mitochondrial lineages in mahseers found in this region.	Biotechnology (BTH)
57	Assoc. Prof. Qasim Ayub	Prof. Ishwar Singh Parhar	Screening candidate genes for variation in growth and reproductive development in Tor fish species.	Mahseers belong to the genera Tor and are found throughout Southeast and South Asia. These fish generally have a large size, but take a long time to reach sexual maturity. This study will use high throughput targeted resequencing of amplified candidate genes involved in fish growth and sexual reproduction to identify variation that could be used not only for sex determination, but also guide on-going conservation efforts in the ASEAN region that aim to preserve the species.	Medical Bioscience (MBS)
58	Assoc. Prof. Qasim Ayub		ACE2 polymorphisms in Malaysian population	ACE2 is the receptor for the dreaded SARS-CoV2 that is responsible for COVID-19 disease in humans. It is unclear what role polymorphisms in this gene play in disease resistance or susceptibility? This project aims to identify the spectrum of mutations in this gene in Malaysians and characterize any high frequency population specific variants.	Medical Bioscience (MBS)
59	Assoc. Prof. Qasim Ayub		Is the selected non-synonymous variant in PCDH15 associated with genetic susceptibility of noise induced hearing loss?	Genome wide selection scans using HapMap and 1000 Genomes Projects (http://www.internationalgenome.org/) in continental human populations from Africa, Asia and Europe have identified hundreds of evolutionarily interesting candidate regions. One outlier region that has been consistently identified across East Asian populations includes a genomic region on chromosome 10 that harbours PCDH15, a member of the cadherin superfamily of calcium-dependent cell-cell adhesion proteins, which is localized in the inner ear hair. The derived allele for a non-synonymous variant in this gene is found at very high frequency in East Asians and is absent elsewhere. A mouse model with the derived human allele has been generated and it shows a reduced auditory brain stem response. In addition, other mutations in PCDH15 have been associated with both non-syndromic and syndromic hearing loss. We would like to examine the effect of the high frequency non-synonymous variant on susceptibility to noise induced or age related hearing loss in Malaysian individuals. The aim of this study is to genotype this variant by using PCR amplification of genomic DNA extracted from saliva samples and Sanger sequencing in 100-200 non-related individuals who have undergone a hearing test to determine the frequency of this variants in this region and examine whether it has any association with noise or age related hearing loss in this population.	Medical Bioscience (MBS)

60	Sadequr Rahman	Dr. Joash Tan	Molecular studies of ESKAPE pathogens and viruses from Segamat	This study builds on the work on the Segamat community that is being carried out with the help of SEACO. Bacterial from two community collections in 2018 and 2019 and Segamat hospital are available for analysis at the molecular level. We also have samples for the characterisation of the gut virome from Segamat. Gut viruses may be associated with various diseases but the virome as a whole is not well characterised. This project will involve wet lab and bioinformatic activities.	Medical Bioscience (MBS), Biotechnology (BTH), BIO
61	Prof. Sadequr Rahman	Qasim Ayub	Epigenetics and stress in chickens	This project will examine the relationship between stress and methylation of the mitochondrial genome in chickens. Both bisulphite sequencing and SMRT technology may be used. This project will involve both wetlab and bioinformatic activities.	Medical Bioscience (MBS), Biotechnology (BTH), BIO
62	Prof. Sadequr Rahman	Assoc. Prof. Qasim Ayub	Phylogeny of housecrows from Sri Lanka	This project builds on our work on housecrows from south Asia and will sequence new samples from Sri Lanka to determine the matrilineal relationship of crows from that part of the world to samples from other countries. This project will involve both wetlab and bioinformatic activities	Biology (BIO), Biotechnology (BTH)
63	Prof. Sadequr Rahman	Dr. Song Beng Kah	Heteroplasmy in the roots of rice	This project will examine the amyloplasts and mitochondria from the roots of cultivated and weedy rice being grown in agricultural fields in order to detect any variations in sequence among samples from a single plant. Such differences may indicate unsuspected interactions between genomes in the rice roots. This project will involve both wetlab and bioinformatic components.	Biology (BIO), Biotechnology (BTH)
64	Assoc. Prof. Siow Lee Fong		Extraction of caffeine from several commercial coffee and tea using Supercritical Fluid Extraction and solvent extraction techniques	Supercritical Fluid Extraction (SFE) is a green method that uses minimum co-solvent for extraction. This study aims to compare the yield of caffeine extracted from several commercial coffee and tea samples using SFE and conventional solvent extraction technique. Purity of cafeinne will be determined using HPLC and TLC methods	Food Science and Technology (FST), Medical Chemistry (CHM)
65	Assoc. Prof. Siow Lee Fong		Effect of pasteurization on the physicochemical, microbial, nutritional & sensory properties of fruit juices/concentrates and their storage stability	Pasteurization is a thermal processing that involves a combination of temperature and time to eliminate desired number of microorganisms. There are various effects of heat on the physicochemical, microbial, nutritional & sensory properties of food. This study aims to determine the effect of pasteurization on these properties of fruit juice/concentrate	Food Science and Technology (FST)
66	Assoc. Prof. Siow Lee Fong		Effect of formulations and sugar alcohols on the physicochemical and nutritional properties of frozen foods	Freezing is important to extend the shelf life of foods. In this study, effect of formulations and sugar alcohols are used to improve the glass transition temperature of frozen foods. Physicochemical, nutritional properties and shelf life of the frozen foods will be evaluated.	Food Science and Technology (FST)
67	Dr. Song Beng Kah		Unlocking the genetic secrets of agronomic traits of Malaysian weedy rice	As the primary weed of direct-seeded rice fields worldwide, weedy rice has commanded considerable attention from researchers seeking to understand its origin and evolution. The high capacity for rapid adaptation that makes these weedy relatives so problematic for rice production also makes them interesting systems for exploring the mechanisms underlying their phenotypic adaptations. Previous studies has provided evidences that wild and domesticated populations contribute to the evolution of Malaysian weedy rice, with introgression of adaptive alleles a likely component of this process. As part of a collaborative research between Monash University and other international universities, this project focuses on Southeast Asian weedy rice as a model system. Using a combination of whole genome and transcriptome sequencing, enriched target sequencing and biochemical assays, we set out to examine allelic variation at genome level, mutation in domestication genes, and changes in agronomical traits in rice.	Biology (BIO), Biotechnology (BTH)

68	Prof. Sunil K. Lal		Molecular biology studies on the COVID-19 SARS-Coronavirus-2 nucleocapsid and its effect on actin reorganization and apoptosis in mammalian cells	In December 2019, a novel coronavirus was isolated from patients exhibiting atypical pneumonia, and was subsequently proven to be the causative agent of the disease now referred to as COVID-19. The complete genome of the SARS-CoV-2 (SARS coronavirus-2) has since been sequenced and the genes cloned. The SARS-CoV-2 nucleocapsid (SARS-CoV-2 N) protein shares little homology with other members of the coronavirus family, thereby making it very unique. In this project, we would like to study the ability of SARS-CoV-2 N to inducing apoptosis in mammalian cells via the ERK (extracellular-signal-regulated kinase), JNK (c-Jun N-terminal kinase) and p38 MAPK (mitogen-activated protein kinase) pathways, and how this affects their downstream effectors. Also SARS-CoV-2 N and its effect on phospho-Akt and Bcl-2 levels, and caspases 3 and 7 will be studied. Also, apoptosis related p53 and Fas signalling pathways are also proposed to be studied in this project. Actin reorganization by p38 MAPK activation and other cytoskeletal changes will also be undertaken to understand the mechanistic details of how the SARS-CoV-2 N manipulates the infected cell in induce actin reorganization and induce apoptosis. This international research project will lead to high-impact publications and a novel hypothesis with long term prospects for a Masters/PhD continuation. A maximum of 2 honours students can join this project and take up different aspects of this study.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)
69	Prof. Sunil K. Lal		Multimerization and biochemical studies on the COVID-19 SARS-Coronavirus-2 non-structural protein 15 and apoptosis in mammalian cells	New therapeutics are urgently needed to inhibit SARS-CoV-2, the virus responsible for the on-going Covid-19 pandemic. Nsp15, a uridine-specific endoribonuclease found in all coronaviruses, processes viral RNA to evade detection by RNA-activated host defense systems, making it a promising drug target. Previous work with SARS-CoV-1 established that Nsp15 is active as a hexamer, yet how Nsp15 recognizes and processes viral RNA and modulates cellular processes remains unknown. In this fast paced project we plan to study the multimerization of nsp15 and its cellular roles in transfected mammalian cells. Mechanistic details of how the SARS-CoV-2 nsp15 manipulates the infected cell and modulates various cellular pathways will be investigated. This international research project will lead to high-impact publications and a novel hypothesis with long term prospects for a Masters/PhD continuation.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)
70	Prof. Sunil K. Lal		Molecular studies on the nucleocapsid protein of Severe Acute Respiratory Syndrome Coronavirus-2 to inhibit the activity of Cyclin-Cyclin-dependent Kinase Complex and S Phase progression in infected mammalian cells	New therapeutics are urgently needed to inhibit SARS-CoV-2, the virus responsible for the on-going Covid-19 pandemic. Deregulation of the cell cycle is a common strategy employed by many DNA and RNA viruses to trap and exploit the host cell machinery toward their own benefit. In many coronaviruses, the nucleocapsid (N) protein has been shown to inhibit cell cycle progression although the mechanism behind this is poorly understood. The N protein of the SARS-CoV-2 bears signature motifs for binding to cyclin and phosphorylation by cyclin-dependent kinase (CDK) and has recently been reported to get phosphorylated by the cyclin-CDK complex. This project aims at investigating if the N protein of SARS-CoV can inhibit S phase progression in mammalian cell lines. Can N protein expression directly inhibit the activity of the cyclin-CDK complex, thus resulting in hypophosphorylation of retinoblastoma protein with a concomitant down-regulation in E2F1-mediated transactivation, is the question being asked. Experiments will be designed to investigate if coexpression of E2F1 under such conditions could restore the expression of S phase genes and the mechanism for N proteins inhibition of CDK4 and CDK2 activity will be studied. Direct binding of N protein to cyclin D to inhibit the activity of CDK4-cyclinD complex; inhibition of CDK2 activity and the molecular mechanism involved will be investigated. Finally, a model proposing S phase inhibitory activity of the N protein will be postulated which will have major significance in understanding viral pathogenesis. This international research project will lead to high-impact publications and a novel hypothesis with long term prospects for a Masters/PhD continuation.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)

71	Prof. Sunil K. Lal		Studies towards finding new COVID-19 disease biomarkers and anti-viral targets in infected human respiratory epithelium	Recently in a collaborative research we have conducted a transcriptome analysis of the respiratory epithelium cells that were transfected with SARS-Coronavirus-2 viral proteins. This high-throughput screen has resulted in a large number of cellular pathways that are now being investigated as possible targets for new disease biomarkers for COVID-19 and possible new anti-viral targets. Students interested can join this multifaceted international collaborative research project to discover the hidden secrets of SARS-Coronavirus-2 and publish their finding in high impact journals. This project will lead to novel research finding with long term prospects for a Masters/PhD continuation. Skills aquired will include but will not be limited to: tissue culture and transfection techniques, western blotting for protein analysis and real-time PCR based mRNA quantification, bioinformatic analysis based protein modelling and cellular imaging techniques.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)
72	Dr. Tan Ji Wei		Effects of Malaysia stingless bee honey on mediators' release by mast cell in allergy	Over the decades, allergic diseases have affected up to 30% of the world population and are currently a major global health problem. Their pathogenesis is constantly linked to the role of mast cells. Although several treatment modalities have been undertaken to tackle the development of allergy, these treatments have limited clinical success and some even lead to serious side effects. Honey is a thick, golden liquid produced by bees that has been used widely for its therapeutic effects. It has been proven to possess various pharmacological properties such as anti-inflammatory and anti-ageing activities. However, the effects of honey in allergy have yet to be elucidated. Thus, this project was designed to study whether a Malaysia stingless bee honey has an effect against selected key mediators' release in mast cell degranulation. The current research project is sufficient to allow 2 students to tag along.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)
73	Dr. Tan Ji Wei		Uncover the Anti-Allergy Effects of Malaysian Stingless Bee Propolis	Propolis is a natural resinous mixture produced by honeybees from substances collected from parts of plants, buds, and exudates. Since ancient times propolis has been extensively employed by man, especially in folk medicine to treat several maladies. Nowadays, propolis is a natural remedy found in many health food stores in different forms for topical use. It is also used in cosmetics or as popular alternative medicine for self-treatment of various diseases. One of the proven biological effects of Brazillian propolis is immunomodulatory including anti-allergy, however little is known regarding the anti-allergy property of Malaysian stingless bee propolis. As propolis of different origin contains different constituents and different geographical origin of propolis sample varies with its biological activity due to different climatic conditions, it would be of our interest to uncover the anti-allergy effect of Malaysian stingless bee propolis in this study. The current research project is sufficient to allow 2 students to tag along.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)
74	Dr. Tan Ji Wei	Prof. Sunil K. Lal	Examination of potential novel interacting partner between mamalian host protein and influenza A virus nucleoprotein.	Currently Influenza A virus (IAV) in Malaysia requires immediate attention for focussed research towards next generation anti-virals. The WHO reports that Malaysia is one of the countries in the region that is most severely affected by IAV and may result in serious loss of life and economic downturn. As such, novel anti-viral compounds must be developed to combat this potential global threat. According to previous reported studies, IAV nucleoprotein (NP) interacts with many host proteins to mediate the localization of viral ribonucleoprotein from the cytoplasm to the host nucleus, thus enabling the expression of new viral RNA. In a recent collaborative research, a few potential interaction partners for IAV NP from human lung cells have been identified which are heat shock proteins (HSP) (90/A8/40/27) and Filamin B proteins. As such, the present project aims to study the signaling pathway involved on how IAV NP modulates the cellular localization of host proteins (HSP and Filamin B) in a cell. This Honours project will mainly utilize the use of cell culture and Western blotting techniques to answer the research objectives.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)

75	Dr. Tan Ji Wei		Understanding the Effects of Different Composition of House Dust Mite Allergens on Junctional Protein Expression in Human Bronchial Epithelial Cells	Human airway epithelium represents a physical barrier against airborne foreign molecules including house dust mite (HDM) allergens and junctional system plays key role in regulating epithelial barrier integrity. HDM allergens have been reported to increase airway epithelial permeability via junctional protein disruption, which eventually initiate the development of allergic airway inflammation leading to asthma. Recent studies showed that the HDM-induced modulation of epithelial immune and barrier responses can be independent of proteolytic activities. Hence, this study aims to examine the effects of different composition of HDM allergens on the expression of junctional proteins in human bronchial epithelial cells.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)
76	Dr. Tan Ji Wei		House dust mite in allergic asthma: Understanding the mechanism	Sensitization to house dust mite (HDM) allergens commonly triggers allergic diseases as allergic asthma, rhinitis and dermatitis through development of allergen-specific IgE responses. The prevalence of HDM allergy is high among industrialized countries, affecting approximately 15-20% of the population. There has been a large amount of studies examined the sensitization profile of human towards proteolytic proteins isolated from HDMs such as Dermatophagoides pteronyssinus and farinae, however, the sensitization profile of human towards non-proteolytic proteins isolated from HDMs remain to be elucidated.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)
77	Dr. Tan Ji Wei		Structure-based virtual screening for the treatment of DENV	Dengue, a mosquito-borne disease, has affected more than 100 countries especially America, South-East Asia and Western pacific regions. According to WHO, dengue virus infects approximately 390 million people annually, with 96 million cases of severe dengue and 20,000 cases of death. Dengue has been classified by WHO as one of the neglected tropical diseases (NTDs). However, there is no therapeutic option for dengue and the treatment is purely supportive via cautious fluid management. In this study, structure-based virtual screening will be performed to identify potential therapeutics for treating dengue.	Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS)
78	Dr. Thoo Yin Yin		Influence of storage on physicochemical of enriched palm oil-based organogels	Organogelation is an alternative processing method to structure lipid oil. Through organogelation, liquid edible oil can be changed into plastic fat without any change in fatty acid compositions or isomers yet maintaining an adequate sensory profile. The aim of this study is to evaluate the suitability of organogel as food matrix to deliver bioactive compounds. Hence, this study will involve development of β-carotene and vitamin E enriched palm oil-based organogels. Followed by storage study to evaluate oxidative and physicochemical stabilities of the resulting organogels.	Food Science and Technology (FST), Biotechnology (BTH)
79	Dr. Wee Wei Yee, Gavin		Computational approach to characterize the evolutionary and functional properties of Mycobacterium kansasii	*Mycobacterium kansasii*, a nontuberculous mycobacterium, is an opportunistic pathogen of humans. It induces pulmonary or disseminated infections in humans infected with HIV. Infection with *M. kansasii*, accompanied by inflamed lymph nodes or pneumonic lesions, has been described in rhesus monkeys, squirrel monkeys, cattle, llamas, goats, camels, and both domestic and feral pigs. Besides, *M. kansasii* causes other clinical manifestations such as lymphadenitis, skin and soft tissue infection, tenosynovitis, arthritis, osteomyelitis and disseminated infection in patients co-infected with human immunodeficiency virus. While the whole genome sequences of *M. kansasii* strains are available on NCBI, no studies have been performed to study the functional properties of *M. kansasii* and comparing the characteristics of the genomes to each other and to other members of mycobacteria. The project will focus on the comparative genomics study between *M. kansasii* and other groups of mycobacteria such as slow-growing and pathogenic members (such as *M. tuberculosis* and *M. leprae*) and other environmental RGMs in the context of virulence genes may enable us to identify the genes that cause *M. kansasii* to be pathogenic and resistant to antibiotics, biocides and other harsh environmental factors. Different Bioinformatics approaches will be used in the project. It is very important that we characterize its genome and evolution to decide if efforts should be underway to keep it under close observation and, if required, aid future efforts at diagnosis, drug and vaccine design.	Biology (BIO), Biotechnology (BTH)

80	Dr. Wee Wei Yee, Gavin		Comparative genomic analysis of Mycobacterium paragordonae, a Potential Novel Live Vaccine for Preventing Mycobacterial Infections	*Mycobacterium paragordonae* (Mpg) is a temperature-sensitive Mycobacterium species that can grow at permissive temperatures but fails to grow above 37°C. Due to this unique growth trait, Mpg has recently been proposed as a novel live vaccine candidate for the prevention of mycobacterial infections. However, the reason behind this uniqueness of Mpg has still remain unknown. The genome of Mpg has not yet been well study. Number of Mpg strains have been deposited in the public database but so far only 1 strain has been study. There are lots of biological information can still be extracted through Bioinformatics and comparative genomic analysis. Thus, this project will focus on the Bioinformatics analysis on the Mpg genome to further explore other unique feature and answer for the respective phenotype show by this species.	Biology (BIO), Biotechnology (BTH)
81	Dr. Zoe Yek Sze Huei		How ant-plant interactions maintains its stability?	Ant-plant symbioses are complex between-species interactions found only in tropical environment. In such interactions, ants protect their plants' host against herbivore attack and plants provides extrafloral nectaries and housing structures as rewards to their ant symbionts. However, this is also a system that is thrive with cheater ant partners. This project will look into mechanisms used by plants to ensure fidelity of their ant partners.	Biology (BIO)

Honours project offered by JCSMHS, BRIMS & School of Pharmacy

No.	Main supervisor	Co-supervisor(s)	Project title	Project description	Honours research area
1	Dr Alice Chuah	Prof Chow Sek Chuen	Fabrication and optimisation of a sustainable water filter membrane	According to WHO statistics, 3.4 billion people worldwide are living in the rural area; and 2.1 billion people have lack of access to clean water. Water security remains a major issue worldwide, affecting the health and quality of life of rural residents. This project involves health assessments rural residents; as well as optimisation of a water filtration membrane suitable to be installed in rural areas. Analysis of the filtrate quality is required to ensure that the membrane is able to filter contaminated water, to provide clean water access to rural residents.	Biotechnology (BTH) and Medical Bioscience (MBS)
2	Assoc. Prof. Anton V. Dolzhenko	Assoc. Prof. Adeline Ting Su Yien and Prof. Chow Sek Chuen	Synthesis and evaluation of carbendazim analogues as agents for crop protection with a potential for repurposing as anticancer therapeutics	Carbendazim is one of the major broad-spectrum fungicides used to control plant diseases in cereals, vegetables, fruits, and even cultivated mushrooms. Due to high popularity and active usage of carbendazim in agriculture for more than 40 years, many parasitic fungi have resistance to carbendazim making this pesticide less effective in the control of crop diseases. We hypothesise that isosteric replacement benzimidazole moiety of carbendazim to the aryl-substituted 1,2,4-triazole ring, which is a common feature of many medicinal and agricultural antifungal agents, may lead to new effective fungicides overcoming the fungal resistance to carbendazim. To evaluate potential of the most effective compounds in terms of development of new pesticides, assessments of their antifungal activity and toxicological profile are included in this project. Preliminary data on anticancer properties of carbendazim form a basis for the assessment of the developed product for such applications.	Medicinal Chemistry (CHM), Biotechnology (BTH)
3	Dr. Nafees Ahemad	Dr. Yeong Keng Yoon	Isolation of natural compounds from Bougania glabra	Plants are promising source of medicinal agents useful for treating various ailments. Several clinically used drugs are either natural products or have been developed from natural products. Cancer is a challenge to mankind though many drugs are available for treatment. Due to toxicity and adverse side effects of existing drugs, there is a need to develop the agents with better therapeutic profile. This project will focus on isolation of natural compounds from a Bougana glabra (aerial Dichloromethane extract). We have previously tested this extracts against variuos cancer cell lines. The extract has shown promising activity.	Medical Bioscience (MBS), Medicinal Chemistry (CHM)
4	Dr Syafiq Asnawi (JCSMHS)	Dr. Adzzie Shazleen Azman (SoS), Prof. Iekhsan Othman (JCSMHS)	Antimicrobial activity screening of Malaysian snake venoms on *Pseudomonas aeruginosa*	The increasing cases of drug resistant and multi-drug resistant bacteria has led to the urgency for new therapeutic agents from various sources including plants, animals and microorganism. One of the latest approach is to find the substances among toxins produced by venomous reptilian such as snakes. The aim of this study is to evaluate the antimicrobial activity of Malaysian snake venoms against Psedumonas aeruginosa	Medical Bioscience (MBS)
5	Dr Syafiq Asnawi (JCSMHS)	Assoc. Prof. Kumaran Narayanan (SoS), Prof. Iekhsan Othman (JCSMHS)	Proteomic Characterization of the Venom from Malaysian venomous jellyfish, *Carybdea alata*	Jellyfish envenomation is a common cause of marine injuries worldwide including Malaysia. There had been several deadly cases of jellyfish envenomation reported in Malaysia that causes Irukandji-like syndrome i.e. profound anaphylactic shock and mortality. Classes of jellyfish that pose threat to human include the box jellyfish (Chironex fleckeri), carybdeids and Portugese man o' war (Physalis physalis). Proteomics information on the venomous proteins/molecules could provide an in-depth insights into the mechanism of toxicity and death caused by these jellyfish. This can also lead towards the development of efficient anti-venom. Additionally, the information can be a valuable resource for novel protein/peptides discovery with potential therapeutic applications.	Medical Bioscience (MBS)

6	Dr Usha Sundralingam	Dr. Joash Tan Ban Lee	Anti aging effects of geraniin from Nephelium lappaceum rind waste.	Ellagitannins a group of polyphenolic compounds found in pomegranate, and berries, has risen to fame for its medical applications since ancient times. Geraniin, an ellagitannin, found in many traditional herbal medicines, exhibits numerous health benefits. The compound reduces obesity, improves insulin resistance, lowers hypertension and ameliorate the risks of metabolic syndrome. There is a huge potential in using geraniin as an antioxidant agent in the anti-aging therapy. However, absorption of geraniin through the complex structure of the skin is an important limiting factor for its numerous health benefits. Latterly, the use of nano-encapsulation specifically nano-phytosome technology for higher absorption, greater protection and controlled release of bioactive compounds have drawn the interest of researchers. Therefore, in this research, geraniin loaded nano-phytosome will be designed to enhance its absorption and study its antiaging effects.	Medical Bioscience (MBS)