

Bachelor of Science (Honours)

Honours topics for Feb intake 2024

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Honours research area: Biology (BIO), Biotechnology (BTH), Medical Bioscience (MBS), Food Science and Technology (FST) or Medicinal Chemistry (CHM)					
No	Main supervisor	Co-supervisor	Project title	Project description	Honours research area
1	Dr Joash Tan	A/P Pooria (Anton Paar, Australia)	Nanocomposite tissue scaffold	Our research group had recently filed a patent for a novel thermoreactive nanocomposite tissue scaffold, which is an injectable material intended for wound healing and cellular regeneration. We intend to continue developing novel variants of this nanocomposite, and characterise their suitability for such applications.	BTH, CHM
2	Dr Ken Yeong		Development of novel benzimidazoles as anticancer agents	Benzimidazoles were shown to possess anticancer activity in numerous studies including those from our group. This exciting project aims to synthesise novel benzimidazoles as potential anticancer agents.	CHM
3	Dr Ken Yeong		Design and synthesis of novel hybrid compounds as antimicrobial agents	Our lab has previously discovered a potent hybrid antibacterial agent based on the molecular scaffold a known antibiotic. This interesting project aims to expand from the previous study to involve new but related compound fragments to understand its structure-activity-relationship.	CHM
4	Dr Ken Yeong	Dr Tang Kim San (Pharmacy)	Bioactivity of Sage Apiana (white Sage)	A recent preliminary report has shown that extract from Sage Apiana is able to inhibit acetylcholinesterase (AChE) enzyme which is implicated in Alzheimer's disease. This project will investigate Sage Apiana for its cholinesterase activity against AChE and BChE, and use certain cell models to study its potential in preventing/treating Alzheimer's disease.	MBS, BTH, CHM
5	Dr Irene Ling	Dr Patrick Tan	Synthesis, characterisation and biological testings of new cationic salts	The project aims to prepare and characterise a series of cationic salts. Selected chemical properties and biological performance will be of focus in this project. This project will involve computational work.	CHM, BTH, MBS, FST
6	Dr Irene Ling	Dr Lim Siew Huah (UM)	Molecular sensors for anionic species	The objective of this project is to synthesise a series of variable counterions with poly-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. This project will involve computational work.	CHM, BTH, MBS, FST

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7	Dr Irene Ling		Synthesis of functional ionic liquids	Ionic liquids are compounds comprised of ions with melting point below 100 °C and exhibit robust properties including high chemical stability, good solubility and low volatility to name a few. The group is currently interested in synthesising novel cations to develop new ionic liquid systems. Our main goal is to address questions such as: How do the molecules of an ionic liquid interact with each other and with the counterions? What are the effects towards the physicochemical properties when different ions are combined within the system?	CHM, BTH, MBS, FST
8	Dr Irene Ling	Dr Sakinah (UITM)	Synthesis and characterization of Schiff bases	The project aims to prepare and characterise a series of Schiff base compounds. Selected chemical properties such as structural and optical will be of focus.	CHM, BTH, MBS, FST
9	Dr Irene Ling		Fabrication and characterization of charged membrane layers for water purification	This widespread problem of water pollution is constantly becoming an issue to humankind. Strategies to remove contaminants/water pollutants is crucial to reduce and eliminate negative effects on the environment as well as human health. Thus, membrane technology in controlling water pollution is rapidly growing. The aim of this study is to synthesise a series of modified membranes with various additives and will be tested for pollutants absorption. The physicochemical properties of membranes will be studied using various techniques (SEM, TEM, FTIR and TGA).	CHM, BTH, MBS, FST
10	Dr Irene Ling	A/P Dr Noor Idayu (UM)	Evaluation of functional glycolipids	The project aims to prepare and characterise a series of glycolipid compounds. Selected chemical properties and biological performance will be of focus in this project. This project will involve computational work.	CHM, BTH, MBS, FST

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11	Dr Cheow Yuen Lin		(Benz)imidazolium salts: Synthesis and Cholinesterase enzymes inhibitory activities	Recent important development of imidazolium salts has been reported in areas such receptors for the recognition of various anions, cations and neutral molecules. Another major area which was explored in the last decade is surfactants and ionic liquids, due to the construction of self-assembled aggregates such as micelles and vesicles in water. Numerous imidazolium salts derivatives have also been reported to display many biological activities. Acetylcholinesterase enzyme (AChE) is one of the most important enzymes in living organisms, which is accountable for the synapse cholinergic and other neural mechanisms. AChE enzyme inhibition has been applied as a marker for the activity of centrally acting AChE inhibitors in the therapy of Alzheimer Disease (AD). In this study, we will evaluate mono and/or bicationic imidazolium salts and their inhibition potential of AChE.	CHM
12	Dr Cheow Yuen Lin		Anticancer Metallopharmaceutical Agents Based on Silver N-Heterocyclic Carbene Complexes	Development of metal-based therapeutics remains an area of huge research interest. The much familiar cisplatin, cis-(NH ₃) ₂ PtCl ₂ together with its second-generation analogues such as carboplatin and oxaliplatin are still the most widely used chemotherapeutic agents. However, platinum-based drugs have several substantial drawbacks namely poor aqueous solubility, severe side effects such as nephrotoxicity, neurotoxicity, ototoxicity, nausea and vomiting further complicate its usage. Last, some tumour cells have also developed resistance toward cisplatin. Thus, this lowers the utility and efficacy of these agents. Metal N-heterocyclic carbene (NHC) complexes have received strong attention due to their application in catalysis, material science and biomedical settings. The focus is shifting beyond Pt as over 300 transition metal NHC complexes are being reported as potential anticancer drugs. Ag(I) NHC complexes with different substituents are found to enhance the activity of silver drugs in anticancer activities effectively. The Ag (I) NHC complexes are also found to display superior biological activity over other silver complexes due to the slow decomposition of Ag(I) complexes and sustainable release of Ag ⁺ ions over a period. In continuation with our research endeavour concerning the synthesis and cytotoxicity evaluation of medicinally important transition metal complexes, we are interested in the synthesis, structure, and cytotoxicity properties of Ag(I) NHC complexes against cancer cell lines.	CHM

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13	Dr Thoo Yin Yin		Development and characterization of gellan gum based degradable films as coating on paper.	Paper and paperboard are environmental friendly packaging materials. Petroleum based materials such as plastic are often used as coating materials to improve its barrier properties such as water passage. The use of plastic material as coating on paper makes it difficult for recycling. Hence, Biodegradable films are a great alternative to non-renewable petroleum based materials. This study aims to explore the use of polysaccharides based mixture as coating materials to paper.	FST, BTH
14	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, maximising 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.	MBS
15	Dr Pushpamalar Janarthanan	Dr Thenapakiam (A*STAR, Spore)	Developing of Carboxymethylcellulose (CMC) polymer coated with modified magnetic iron oxide (Fe ₃ O 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 ₃ O ₄ nanoparticles were coated by silica, metformin and amine, and then subjected to form matrix membranes. The prepared membranes were characterised 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.	BTH

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16	Dr Pushpamalar Janarthanan		Green biosynthesis of silver nanoparticles using plant extract and investigate the antimicrobial properties	<p>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.</p> <p>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 polyphenols, 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.</p>	BTH

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17	Dr Pushpamalar Janarthanan	Prof Phil Andrew (School of Chemistry, MUA), Dr Thenapakiam (A*STAR, Spore)	Developing methods for the incorporation of bismuth into functionalized carboxymethylcellulose hydrogels and subsequent assessment against a range of multi-drug resistant bacteria	<p>Bismuth compounds are well known for antimicrobial activity, especially in assisting the treatment and eradication of <i>Helicobacter pylori</i>. The current approved medical treatments for <i>H. pylori</i> 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 (e.g. 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.</p> <p>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 ($-\text{CH}_2\text{COOH}$). Moreover, CMC is known to have a high transparency and mechanical strength, good water solubility as well as excellent hydrogel-forming properties. 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.</p> <p>This joint 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 <i>Helicobacter pylori</i>, or alternatively as a drug carrier.</p>	BTH

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18	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 fibre 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 fibre 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 be able to delay in vitro hydrolysis due to its intrinsic water repellent capabilities.	MBS
19	Dr Pushpamalar Janarthanan	Dr Pushpamalar Janarthanan/ A/P Pooria (Industry)/ 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 homogenised 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 dextrans 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 the targeted sites and drug molecules are being released without harming the normal cells along the gastrointestinal passages.	MBS

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20	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)
21	Dr Pushpamalar Janarthanan	Dr Thenapakiam (A*STAR, Spore)	Preparation of Nanocrystalline Cellulose (NCC) From Oil Palm Empty Fruit Bunch and incorporation into graphene oxide for electroactive material	This project on synthesis and characterization of nanocrystalline cellulose (NCC) from plant fibres has been reported widely and used for building materials, paper, textiles and clothing. These raw materials have received considerable interest as a source of chemical feedstock in recent years due to their high abundance, renewability, biodegradation, nontoxic and low cost of production.	Biotechnology (BTH)
22	Prof Adeline Ting		Manipulating biosynthesis of polyhydroxybutyrates (PHBs) by bacteria and characterization of the bioplastics produced	This project explores the various biotic and abiotic factors that influence the synthesis of essential PHBs that are biopolymers used for bioplastic development. The biotic and abiotic factors will be manipulated and the PHBs produced by the bacterial isolates will be examined. The PHB film (bioplastic) is then developed, and the profile of the PHB film developed from PHBs will be established. This study is expected to present findings to factors that influence biosynthesis of PHBs in bacteria, and the gradual characteristics of the PHB film (bioplastics) produced.	BIO, BTH, MBS, FST, CHM

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23	A/P Choo Wee Sim		Application of high-pressure homogenization on recovery of bioactive compounds from pomegranate husk and pomace	Pomegranate husk and pomace are generated from the fruit processing industry, and are potential sources of active ingredients such as polyphenols that are known for their antioxidative properties. Both contain substantial amounts of phenolic compounds, including flavonoids (anthocyanins, catechins and other complex flavonoids) and hydrolyzable tannins (punicalin, pedunculagin, punicalagin, gallic and ellagic acid). This study will investigate the use of an emerging technology, high pressure homogenization in recovery of these bioactive compounds from pomegranate husk and pomace. The extracts can be used as functional food or nutraceutical ingredients.	FST, BTH
24	A/P Choo Wee Sim		A comparative study of drying effect for <i>Justicia gendarusa</i> : Influence on phenolic and flavonoid contents, antioxidant efficacy, and antimicrobial potential.	<i>Justicia gendarusa</i> is a medicinal plant used traditionally to treat chronic rheumatism, headache, earache, fever, cough, bronchitis, inflammation, bruises, paralysis of one side of the body and facial paralysis. To prepare a standardised extract, drying has to be carried out. This research investigates the use of two drying methods, i.e., spray drying and freeze drying and their influence on phenolic and flavonoid contents, antioxidant activity and antimicrobial potential against various Gram-positive and Gram-negative bacteria.	FST, BTH
25	A/P Choo Wee Sim		Evaluation of phenolic and flavonoid levels, antioxidant potential, and antimicrobial properties in <i>Typhonium flagelliforme</i> cultivated via soil and hydroponic methods	<i>Typhonium flagelliforme</i> is a tropical plant, traditionally used by the ethnic population of Malaysia to cure various cancers. This plant has been shown to induce antiproliferative effects and apoptosis in cancer cells. This research investigates the phenolic and flavonoid contents, antioxidant potential and antimicrobial properties against various Gram-positive and Gram-negative bacteria of <i>Typhonium flagelliforme</i> cultivated via soil and hydroponic methods.	FST, BTH
26	A/P Choo Wee Sim		Optimising the extraction of bioactive compounds from <i>Barleria lupulina</i> : Analysis of phenolic and flavonoid content, antioxidant and antimicrobial activities	<i>Barleria lupulina</i> is a medicinal plant used traditionally to reduce inflammation caused by insect bites, snake bites, boils, and rheumatism. This research investigates the optimization of the extraction of bioactive compounds, such as phenolic compounds and flavonoids from <i>Barleria lupulina</i> . The antioxidant and antimicrobial activities of the extracts will be investigated as well.	FST, BTH

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27	Dr Wan Faridah Akmal Jusoh	Dr Serina Rahman (Department of Southeast Asian Studies, National University of Singapore)	Local Knowledge and Uses of Seagrass Meadows in Sungai Pulai Estuary, Johor	This research delves into the relationship between seagrass meadow resources and the local knowledge and practices of the community in Mukim Tanjung Kupang, Johor. It highlights the importance of incorporating this knowledge into marine ecology for effective conservation efforts and economic growth. The study underscores the significance of traditional conservation methods and beliefs for sustainable marine resource management.	BIO, BTH
28	Dr Wan Faridah Akmal Jusoh	Dr Mogana Darshini Ganggayah (School of Business)	Tracing the Luminescent Path: A Natural Language Processing Exploration of Firefly Ecology and Evolution through Literature	The "Tracing the Luminescent Path" project utilises natural language processing (NLP) to delve into firefly ecology and evolution through extensive scientific literature analysis. By employing NLP techniques, the project seeks to extract and analyse information about firefly species, behaviours, habitats, and genetic variations from a diverse range of research sources. This exploration of patterns and trends within the literature aims to construct a comprehensive narrative of firefly evolution, contributing to evolutionary biology insights and highlighting NLP's potential in extracting valuable scientific knowledge from extensive textual data.	BIO, BTH

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29	Dr Tan Ji Wei	Dr Adzzie Shazleeen Azman	Determination of the potential antimicrobial properties of Malaysian honey as an adjuvant treatment against acne	<p>Acne is a skin condition when your hair follicles become plugged with oil and dead skin cells. It causes whiteheads, blackheads or pimples. Acne is most common among teenagers, though it affects people of all ages. Various bacteria and fungi live on our skin and consume the oil we naturally produce as a food source. Whenever the hair follicles on your face are plugged with oily substances called sebum, these microorganisms can trigger inflammation and infection, resulting in more severe acne.</p> <p>Like many natural remedies, honey has been used for ages to try and prevent acne and remove blemishes that already exist. Skincare benefits that are commonly associated with honey include the ability to fight and kill bacteria and fungi, alongside with its anti-inflammatory properties. Even though honey is often touted as good for acne control because it's believed to balance microorganism levels on the skin, promote healing, and lower inflammation, there is no evidence to suggest that honey alone can get rid of acne. Therefore, this Honours project aims to conduct a preliminary study of Malaysian honey as an adjuvant, alongside with other selected medication treatments against some of the selected acne bacteria and fungi.</p>	BIO, BTH, MBS
30	Dr Tan Ji Wei	Dr Chong Lor Huai (School of Pharmacy)	Preliminary study on the anticancer effects of natural compounds in a 3D cell culture model.	Cell culture is commonly used as an in vitro tool for improving the understanding of cell biology and its mechanisms of diseases, drug action, and protein production. Since the development of cell culture in the early 20th century, most research conducted on cancer biology is based on experiments using two-dimensional (2D) cell cultures in vitro. However, these 2D cultures carry many disadvantages that limit the findings of scientific studies. These limitations have led to the creation of a three-dimensional (3D) culture model, which more closely resembles the conditions in vivo. This Honours project will explore the anticancer effects of a few selected natural compounds using a simple 3D cell culture model.	BIO, BTH, MBS

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31	Dr Tan Ji Wei	Dr Wendy Yeoh (School of Pharmacy) Dr Faizul Jaafar (School of Medicine)	The effects of a human peptide on insulin secretion and sensitivity in an in vitro skeletal myoblast model.	Diabetes is characterised by defects in insulin secretion, insulin action, or both which is the key player in the maintenance of glucose homeostasis. Studies have shown that skeletal muscle is one of the main insulin-target tissues and unmanageable insulin resistance can lead to type 2 diabetes (T2DM). Therefore, efforts are undergoing to find various ways to address this challenge. Several studies have provided evidence in support of the emerging role of spexin (SPX) in regulating glucose metabolism for diabetes. However, the mechanism of action of SPX in modulating insulin-stimulated glucose uptake in skeletal muscle cells remains elusive. This Honours project's main aim is to investigate the beneficial effect of SPX in enhancing insulin sensitivity and secretion in skeletal muscle cells.	BIO, BTH, MBS
32	Dr Michelle Yap		Pathway analysis and biomarkers discovery in cytotoxin-induced cell death	Cytotoxin is a three-finger toxin present predominantly in cobra venom, which is known to cause dermonecrosis in cobra bites. Our lab has found that cytotoxin induces a transition of cell death from apoptosis to necroptosis when the concentration increases. Furthermore, prolonged exposure time to cytotoxin exacerbates the pathogenesis of dermonecrosis. In our proteomic analysis of cytotoxin-induced dermonecrosis model, we found significantly distinguished in protein expression in cytotoxin-envenomed cells. However, little is known about the possible biomarkers detected during the pathogenesis of dermonecrosis which can be used as a diagnostic indicator of the severity of cellular damage, for development of suitable therapeutic options. Therefore, in this project, we aim to identify the alteration of key proteins which could be discovered as an excellent biomarker indicator for the severity of dermonecrosis. Reading lists: https://www.sciencedirect.com/science/article/pii/S2590171022000339 https://www.sciencedirect.com/science/article/abs/pii/S1876162322000682?via%3DiHub https://www.sciencedirect.com/science/article/abs/pii/S014181302101374X	MBS

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33	Dr Michelle Yap	Dr Adzzie Shazleen Azman Dr Ken Yeong	Modification of venom-derived peptides as antimicrobial molecules: Mechanisms of actions	Antimicrobial peptides are well studied for their antibiotic properties due to broad specificity on both gram positive and gram-negative bacteria. Despite so, the limited options are available on antibiotic databases because many of these peptides remain understudied, especially those with basic properties. Our lab has discovered a few potential venom-derived peptides with antimicrobial potentials. In this study, we will modify these peptides to enhance their antimicrobial properties. Their mechanisms of actions will also be investigated	MBS, CHM
34	Dr Adzzie Shazleen Azman		Characterization of a Streptomyces strain and its in-vitro antimicrobial properties against medically important pathogens	Streptomyces are Gram-positive bacteria with higher GC content, about 69–78%, and physiological characteristics resembling many fungal species. They are the most prolific secondary metabolites producer under the Actinomycetota phylum (previously known as Actinobacteria). Recent data shows that a total of 279 new natural products have been isolated from 121 Streptomyces spp. with diverse biological activities, proving them to be an important source of pharmaceutically important drugs. This project aims to characterise a Streptomyces strain isolated from forest soil in Pahang using different methods, including phenotypic, phylogenetic, and genomic analysis. The antimicrobial potential of its secondary metabolites will also be investigated.	BIO, BTH, MBS
35	Dr Ang Chee Wei		Synthesis of new primaquine compounds	Primaquine is an 8-aminoquinoline antimalarial that has been widely used to cure relapsing malaria. However, it suffers from poor metabolic stability and causes haemolytic toxicity in patients with deficiency in glucose-6-phosphate dehydrogenase (G6PD). This project aims to synthesise new primaquine derivatives by installing various substituents at the C-5 position of the quinoline ring.	CHM
36	Dr Ang Chee Wei		Nitroaromatic compounds as antimicrobial agents	This project aims to synthesise new nitroaromatic compounds and to study their activity against both Gram-positive and Gram-negative bacteria.	CHM, BTH

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37	A/P Siow Lee Fong		Comparison of the stability and physicochemical properties of encapsulated alpha-tocopherols and tocotrienols	Alpha-tocopherols and tocotrienols are a family of Vitamin E. Alpha-tocopherol has become an important food additive due to its antioxidant effect and capacity to increase shelf-life of products. However, it is a hydrophobically active compound, which compromises its applicability in soft drinks and fruit beverages. Tocotrienol studies confirm anti-oxidation, anti-inflammatory potentials and suggest anti-cancer effects better than the common forms of tocopherol due to their chemical structure. Both tocopherol and tocotrienol have been reported to be unstable and easily oxidised. This study aims to work on the encapsulation of alpha-tocopherols and tocotrienols using inclusion complex with cyclodextrin and to evaluate the stability and physicochemical properties of the alpha-tocopherol-cyclodextrin and tocotrienol-cyclodextrin inclusion complex in food systems.	FST
38	A/P Siow Lee Fong		Young and old jackfruits: Chemical composition and quality evaluation of food products made from jackfruits	Premature and mature jackfruits differ in their chemical composition. This study aims to characterise the chemical composition of premature and fully mature jackfruits and to produce and characterise the quality attributes of meat analogue made using the suitable jackfruits.	FST
39	A/P Siow Lee Fong		Effect of various starches and binders on the textural and sensorial properties of plant based burgers	Plant based burgers made from several plant based proteins have always been reported to have low sensorial acceptance and lack of the bite back properties compared to meat burgers. This study aims to evaluate the effect of various starches and binders on the textural and sensorial properties of plant based burgers.	FST
40	Dr Lee Sin Yee		Development of healthier cake premix using various fruits seeds	Fruit seeds that are prospective sources of nutrients and bioactive compounds are usually disposed of after the processing of fruits into various fruit products. This project aims to develop a healthier cake premix using various fruit seeds	FST

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41	Dr Patrick Tan		Investigating the efficiency of Antimicrobial Resistance Genes (ARG) removal in wastewater treatment plants	Antibiotics have saved millions of lives since their discovery more than 50 years ago. These drugs are commonly prescribed to combat bacterial infection. However, in the recent decade, there has been a rapid rise in antimicrobial-resistant bacteria. Horizontal gene transfer of the resistance gene between bacteria is one of the most common methods for bacteria to acquire resistance. Hence, it is crucial to understand the prevalence of these resistance genes from the environment. The aim of this study is to investigate the presence of antimicrobial resistance genes (ARG) in wastewater treatment plants. This project will utilise molecular biology methods to identify ARG from environmental samples. Students will employ various molecular biology, microbiology and bioinformatics techniques in this project.	BIO, BTH, MBS
42	Dr Patrick Tan		Investigating the protective effects of various probiotics against bacterial infection using non-murine infection model	In the last two 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. Majority of the antibiotics were designed to target bacterial proteins that are essential for growth. However, this strategy has become ineffective due to the rapid exchange of antibiotic resistance genes and mutations in pathogens. The aim of this project is to investigate the effects of probiotics against selected multidrug-resistant pathogens using a <i>Galleria mellonella</i> as a screening system. This project will explore the field of probiotics and infection biology, employing various molecular biology and microbiology techniques.	BIO, BTH, MBS
43	Dr Patrick Tan		Screening and characterisation of capsaicin-degrading bacteria	Many people enjoy the 'high' sensation of spicy food, with the burning sensation spreading across the lips and igniting the tongue. This heat sensation is mediated by capsaicin, a chemical compound found in chilli peppers. However, high levels of undigested capsaicin may result in a burning anus and gastrointestinal (GI) disorders, including abdominal pain and diarrhoea. To help address this issue, this project aims to screen and characterise bacteria that can digest capsaicin. Students will employ various molecular biology, and microbiology techniques in this project.	BIO, BTH, MBS

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No	Main supervisor	Co-supervisor	Project title	Project description	Honours research area
44	Dr Patrick Tan	Dr Ken Yeong	In vitro synthesis of antibiotics from a soil bacterium	Antibiotics have saved millions of lives since their discovery more than 50 years ago. These drugs are commonly prescribed to combat bacterial infection. However, there has been a rapid rise in antimicrobial-resistant bacteria in the recent decade, while the discovery and production of new antibiotics have decreased. The aim of this study is to produce new antibiotics derived from a soil bacterium <i>in vitro</i> using a combination of chemical peptide synthesis and recombinant DNA technology. Students will employ various organic chemistry, molecular biology, microbiology and bioinformatics techniques in this project.	BIO, BTH, MBS, CHM
45	Dr Patrick Tan	Dr Nicholas Khong (School of Pharmacy)	Investigating the toxicology of pharmaceutical compounds in a non-murine animal model	Larvae of the greater wax moth, <i>Galleria mellonella</i> , have recently been used as model hosts for studying pathogenic microorganisms as an alternative to vertebrates. This project investigates and correlates existing <i>in vivo</i> toxicity in the non-murine animal model, <i>G. mellonella</i> . A large range of polyphenolic standards, with known toxicity and antioxidant activity, will be tested against this insect model.	BIO, BTH, MBS
46	Dr Md Zobaer Hasan		Identify the key risk factors of child malnutrition in Selangor state of Malaysia.	This study attempts to identify the key risk factors of child malnutrition in the Selangor State by using a statistical approach.	MBS
47	Dr Md Zobaer Hasan		Comparison between Science undergraduate and post-graduate students about the prevalence and factors associated with smoking in Malaysia	A cross-sectional study will be conducted to determine the prevalence and associated factors for smoking among the science undergraduate and post-graduate students and compare them.	MBS
48	Dr Md Zobaer Hasan		Perception and practice of traditional and complementary medicine among Malaysian: A case study from 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. To 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 guidelines for marketing and use.	MBS

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No	Main supervisor	Co-supervisor	Project title	Project description	Honours research area
49	Dr Md Zobaer Hasan		The effect of Covid-19 on treatments available for Malaysian children with autism	The aim of this research is to identify the key effects of Covid-19 as a whole on the different types of treatments available for children with autism in Malaysia. We will undertake research to understand what these treatments are, how the ongoing pandemic has been affecting it, and how it has impacted the prognosis of these children.	MBS
50	Dr Md Zobaer Hasan		A survey on the experience of children with autism in normal school settings in Malaysia	A key aspect for the success of inclusive education is collaboration and cooperation between schools, healthcare systems and the parents or guardians of autistic children. To understand this relationship and the several other factors that affect an autistic child's experience in a regular school setting, we will design an experimental survey. The objective is to quantify the qualitative data to understand the experience of the children better.	MBS
51	Dr Md Zobaer Hasan		Challenges faced by young adults with autism in the Malaysian workforce	Young adults (YA) with autism worldwide have to face a multitude of problems and it is no different in Malaysia. The aim of our research is to identify what these challenges are in the context of Malaysia after identifying the main workforces that will hire YA's with autism.	MBS
52	Dr Md Zobaer Hasan		Home-based treatment interventions available in Malaysia for children with Autism Spectrum Disorder	The aim of our study is to identify the main home-based treatment options utilised by Malaysian parents in the treatment of autism. This will help us further examine the effectiveness, trends, and scope of such treatments.	MBS
53	Dr Md Zobaer Hasan		A comparative analysis about the therapeutic approaches available for treating Asperger's syndrome in Malaysia	Asperger's syndrome is a neurodevelopmental disorder comprising of serious difficulties in the behavioural context and falls under the branch of autism spectrum disorder (ASD). There are several therapeutic approaches utilised in the treatment of Asperger's in Malaysia. The objective of our study will be to identify these treatments and conduct a comparative analysis to understand the variability in treatment functionality and key aspects defining them.	MBS
54	Dr Md Zobaer Hasan	Prof Qasim	Attitudes towards genomics: DNA and Big Data	We could explore the attitudes of students towards genomic data sharing, communication of genetic information and sharing of incidental findings from whole genome studies.	BIO, BTH, MBS

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No	Main supervisor	Co-supervisor	Project title	Project description	Honours research area
55	Dr Md Zobaer Hasan	Dr Foo Su Chern	Investigating the prevalence of micronutrient deficiency (iron, zinc and carotenoids) among Malaysian groups	<p>Micronutrient deficiency is a major global health concern impacting millions of individuals, yet the lack of extensive research in Malaysia is concerning. Despite progress in healthcare, micronutrient deficiency, especially in carotenoids, remains underexplored, with only a handful of studies on vitamin deficiencies reported in the literature (Akhtar et al., 2013; Tan et al., 2023). This results in a critical knowledge gap that hinders effective interventions, e.g., nutritional supplement programs for marginalised groups. Research is vital to address this issue comprehensively, as it can provide insights into the prevalence of deficiencies across diverse population groups and regions, guiding targeted interventions and public health campaigns.</p> <p>To address the research gap, a statistical study with robust methodologies will be conducted to understand micronutrient deficiency in Malaysia and develop evidence-based strategies for better health outcomes.</p>	
56	Dr Lee Yee Ying		Oleogel Development for Plant Based Meat Analogue	Meat analogues are a growing trend in the food science and technology field due to ethical, environmental, health, and sustainability concerns. Researchers have done extensive work to develop plant-based proteins that closely resemble meat in terms of their sensorial properties. However, it is important to note that fats and oils also play a critical role in determining the texture and flavour of meat analogues. This project aims to address this gap in the literature by developing suitable fat substitutes for meat analogues through oleogelation technique.	FST
57	Dr Lee Yee Ying		Palm-based Cheese Analogue	Cheese analogue is a plant-based alternative to dairy cheese. It has several advantages over dairy cheese, including being lactose-free and requiring less arable land. Cheese analogues are available in a variety of forms and can be used in many dishes. This project investigates the development and characterization of cheese analogue made from palm sources. The researchers will study the effects of different plant protein sources and vegetable oils on the physical and chemical properties of cheese analogue	FST

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No	Main supervisor	Co-supervisor	Project title	Project description	Honours research area
58	Dr Lee Yee Ying		Beef Fat Replacer for Preparation of a Healthier Choice Beef Patties	In recent years, consumers are sceptical about the consumption of meat and meat products 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 generates a tremendous amount of the underutilised seed meal that is rich in protein and the 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.	FST
59	Dr Lee Yee Ying		Reduced Calorie Omega-3 Fat Spread Prepared from Nanocellulose as Fat Mimetic	Margarine is a type of oil-in-water emulsion where the water droplet is dispersed in the continuous phase containing the fat crystals. Ever since being used as a substitute for butter, the development of margarine evolved tremendously. Margarine nowadays exists in many different forms depending on its application such as bakery margarine, puff pastry margarine and table margarine to low calorie spreads. Despite providing the desirable taste, aroma and texture, margarine and spread are considered as high-fat products that are likely to increase the risk of developing several metabolic diseases. Nanocellulose is a cellulosic material with nanosize in range. Recently, nanocellulose received tremendous attention as a natural emulsifier, stabiliser and fat mimetic in the food industries to stabiliser food emulsion. As a source of dietary fibre, nanocellulose also exhibits several healthful function properties to manage obesity, cardiovascular disease, diabetes and other types of diseases. Looking at the beneficial health effect and the viscosifying properties of the nanocellulose, the present study aims to develop a healthier version of omega-3 low calorie spread using nanocellulose as fat mimetic before further investigating its storage stability for one month.	FST

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No	Main supervisor	Co-supervisor	Project title	Project description	Honours research area
60	Dr Lee Yee Ying		Plant-based 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 in that they are suitable for vegan and lactose intolerant 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 underutilised, 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.	FST
61	Dr Lee Yee Ying		Gummy Candies Infused with Palm Phytonutrients	Carotene, which commonly gives orangy colour to fruits and vegetables is a powerful source of antioxidants and provitamin A. As a potent antioxidant, carotene can quench singlet oxygen and scavenge reactive oxygen species, which is beneficial in managing the onset of non communicable diseases. Hence, it is worth to harness its application in fostering a thriving community specifically to manage the rising ageing population as an anti-aging agent. The proposed research aims to investigate the incorporation of carotene into bioactive nanocapsule gummy supplement enriched which has potential to manage multiple common conditions in older age	FST
62	Dr Lee Yee Ying		Synthesis of Medium and Long Chain Triacylglycerol Functional Oil for Functional Ingredients Development	Medium- and long-chain triacylglycerols (MLCTs) are a type of structured lipid that contains both medium-chain and long-chain fatty acids. MLCTs are known for their anti-obesity properties, which are attributed to the unique metabolism of medium-chain fatty acids. They are also gaining popularity in China, where they are now permitted to be used in infant formula. This study aimed to synthesise and characterise MLCTs derived from tropical oils using a green enzymatic approach. The research work also interested in evaluating the potential of these MLCTs to be used as powdered functional ingredients, such as in infant formula.	FST

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No	Main supervisor	Co-supervisor	Project title	Project description	Honours research area
63	Dr Lee Yee Ying		Development of Barista Plant based Milk (in collaboration with industry)	Plant-based milk is a water-soluble extract made from cereals, oilseeds, seeds, nuts, or legumes that resembles cow's milk. It has recently gained popularity due to ethical, environmental, sustainability, and health concerns, similar to the recent trend of meat analogues. Barista milk is a type of plant-based milk that is used to make high-quality milk-based coffee drinks, including foamed milk. This project aims to develop and investigate different types of stabilisers and emulsifiers for the preparation of barista milk, and to further evaluate their functionality in beverage applications	FST
64	Dr Faddrine Jang		Toxicity Impacts of Cigarettes on Aquatic Environment	This project studies and compares the impacts of both conventional cigarettes as well as disposable electronic-cigarettes (e-cigarettes or vapes) on the aquatic environment. The rate of toxicity/pollutant release from the components of both the cigarettes will be measured using water quality parameters and metal concentration analyses. Their subsequent potential as platforms for pollutant dispersal will also be determined.	BIO
65	Dr Faddrine Jang		Micro-Nano Plastics in Seafood	The ingestion of microplastics has been reported in many species of fish intended for human consumption. In this project, students will assess plastic particles (micro-nano plastics) availability in market sourced seafood – fish, prawn, bivalves, crabs.	BIO
66	Dr Faddrine Jang		Microplastics in the Aquatic Environment	This project will assess microplastics availability and distribution at different types of aquatic environment which includes freshwater, marine, estuarine, and inland water bodies such as lakes.	BIO
67	Prof Sadequr Rahman	Dr Patrick Tan, Dr Joash Tan	Characterisation of ESKAPE pathogens from Segamat	ESKAPE is an acronym from the first letters of the microbes that cause most of the deaths from infections in hospitals. Reducing the impact of these organisms on health is therefore a subject of great interest. We have collected various ESKAPE pathogens from the hospital in Segamat, in south Malaysia and also from the healthy community there. This project will characterise the ESKAPE pathogens from the hospital and the community through genome sequencing and pathogenicity assays using the moth <i>Galleria mellonella</i> .	BIO, BTH, MBS

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No	Main supervisor	Co-supervisor	Project title	Project description	Honours research area
68	Prof Sadequr Rahman	Dr BK Song, Prof Qasim Ayub	Epigenetic changes in organellar DNA in rice	We have previously shown that the methylation of the chloroplast is different between the leaf and the grain in rice using bisulfite sequencing. In this project, we will compare the methylation of organellar DNA with that of leaf DNA at three stages of development--young seedlings, mature plants and near senescence using cutting edge sequencing technologies.	BIO, BTH
69	Dr Ng Chen Seng		Single cell spatial landscape for the spinal cord tissues in ALS model.	<p>Amyotrophic lateral sclerosis (ALS), one of the most common neuromuscular diseases, is a devastating incurable illness that leads to progressive paralysis and premature death, usually within 5 years of diagnosis. Drug treatment to slow ALS progression is limited to one drug, riluzole, which only prolongs survival by a few months. Very little is known about the molecular causes of ALS. To gain an understanding of how mutations in SOD1 cause ALS, mouse models were generated and have been used extensively to study ALS onset, progression and therapeutics. In this project, candidate will dig into the single-cell data produced by experiments conducted by previous students, to understand which cell types are contributing to disease progression.</p> <p><i>*Candidate is required to have a background in bioinformatics for this project</i></p>	BIO, BTH
70	Dr Ng Chen Seng		Characterization of innate immune pathways in MSC in response to H1N1 and H3N2	Mesenchymal stem cells (MSCs) also known as mesenchymal stromal cells are multipotent stromal cells that can differentiate into a variety of cell types. MSC has been widely utilised to treat various infectious diseases & yet the mechanism is unknown. In this project, candidate will characterise the innate immune sensing in these cells upon challenge by H3N2 and H1N1.	MBS
71	Prof Qasim Ayub	Chong Chun Wie	Association of human genetic variation with faecal microbiomes?	This project aims to study an association between faecal microbiomes and human genetic variation. Targeted ressequencing will be used to amplify faecal DNA to genotype candidate human variants associated with population stratification and metabolic diseases such as obesity and type 2 diabetes. The student will learn to design primers for Illumina sequencing and conduct amplification, library preparation and short-read sequencing data analysis.	BIO, MBS, BTH

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No	Main supervisor	Co-supervisor	Project title	Project description	Honours research area
72	Prof Qasim Ayub	Aswini Leela Loganathan	Characterising parasitic variation in the Jehai.	We have identified high prevalence of intestinal parasites (Trichuris and Ascaris) in the Jehai population. This project aims to amplify targeted parasitic genes and analyse parasitic variation in the infected individuals. Targeted ressequencing will be used to amplify parasitic DNA obtained from the faeces of infected individuals. The student will conduct amplification, library preparation and short-read sequencing data analysis and construct phylogenetic networks or trees to assess genetic variation in the sequenced samples. .	MBS, BTH
73	Prof Qasim Ayub		Investigation of active microbes in the North Selangor Peat Swamp Forest soil using BONCAT-FACS 16S rRNA gene resequencing.	Microbes control the fate of the carbon cycle of the planet, including vulnerable carbon-rich ecosystems like tropical peatlands. 16S rRNA gene sequencing has enabled us to investigate the microbial community of the North Selangor Peat Swamp Forest soil ecosystem, but it does not allow us to distinguish which microbes are in active or dormant state. High throughput physiological methods such as bioorthogonal non-canonical amino acid tagging (BONCAT) enables identification of the active fraction of the soil microbiome. Translationally active microbes would incorporate clickable amino acids such as L-azidohomoalanine (AHA) and L-homopropargylglycine (HPG) into their proteins as L-methionine analogs. These alkyne bond-containing amino acids can then be tagged with a fluorescence label and the active fraction recovered with a fluorescence-activated cell sorting (FACS). Using this experimental setup we can identify the active fraction of the soil microbiome upon human alteration of the peat soil environment such as higher temperature incubation (mimicking global warming), long term inundation, draining or nitrogen amendment.	BIO, BTH
74	Prof Qasim Ayub	Aswini Leela Loganathan	Investigating adaptive loci in East Asian populations.	Genomic selection scans have identified thousands of variants that lie in genomic regions in Asian populations with large number of candidate genes. This in silico project aims to use publicly available sequencing datasets to identify genes that maybe the target of positive selection in East Asian populations and characterise the candidate variants functionally using a population genomics approach.	BIO, BTH, MBS