Tel-Hai College

JNF HOLLAND

Research Internship Offer For Dutch M.Sc. Students

(Sponsored by JNF Holland)

January 2023

Background

Tel-Hai College, inspired by its founders' spirit of pioneering excellence and entrepreneurship, is a growing leader of higher education and scientific inquiry in Israel's northern Galilee. Set in the heart of spectacular scenery, Tel-Hai, with its unique Galilee character, has become a hub that attracts superb scientists and talented young adults from across Israel and around the world.
Tel-Hai's location, adjacent to the diverse ecosystems of the Hula Valley, the agricultural fields and bird migration routes along the Great Rift Valley, and the frontline communities scattered along Israel's volatile northern borders, designates its mission to explore and harness the region's resources to create academia and science of global significance.



Tel-Hai's flagship disciplines are Food and Nutrition, Health, Environment and Biotechnology. Much of the College's academic breadth and scientific stamina stem from its strategic affiliation with **MIGAL - Galilee Research Institute** located in Kiryat Shemona. Tel-Hai is the only college in Israel with an affiliate research institute. The Eastern Galilee, home to diverse ecosystems within a 40 km radius, is positioned to be the center of Israel's Agri-Food Tech industry. To this end, Tel-Hai College and MIGAL-Galilee Research Institute, work in close collaboration to create cutting-edge research, dedicating programs and facilities to advancing the Agri-Food Tech field. These include a new analytic research lab, the most advanced food sensory lab in Israel, a product development kitchen where food science students learn how to develop healthy, eco-friendly, innovative food products, a pilot dairy plant and an educational winery.

Research Internship Program

Tel-Hai College and our affiliate MIGAL Research Institute, sponsored by JNF Holland, offer education and research opportunities through our Research Internship Program. If you are an ambitious and curious M.Sc. student from the Netherlands, wanting to experience working on current, high-impact research projects within Tel-Hai College academia, this opportunity is for you.

The duration of the internship is typically one semester (4 months). These short-term placements give students the opportunity to gain valuable hands-on research experience in a particular laboratory, develop their independent research skills and/or learn specific techniques under the direction of a leading research scientist/faculty member. Listed projects usually form part of a larger research project supervisors are running at Tel-Hai/MIGAL, working at the forefront of their disciplines to push forward the boundaries of knowledge.

Financial Support

Successful applicants will be provided with a generous scholarship from our partners at JNF Holland. The scholarship will cover;

Travel expenses

- One direct round-trip air ticket

Accommodation

- On our off-campus student dormitory complex

Internship Allowance

- Up to 40 euros per day provided for daily expenses (food, transportation etc.)

Other support

Tel-Hai College's International Academic Affairs Unit will support the incoming students with all necessary administrative aspects of their arrival; visa application support, insurance guidance, housing, and any other assistance they may need during their stay

A list of current short-term research internship projects, including supervisor details, research impact, tasks and eligibility follows below. The exact dates of stay/internship tasks will be determined together with the academic supervisor in the lab/project via an online Zoom meeting after application and prior to arrival.

Initial enquiries should be sent to karins@telhai.ac.il where further registration/application details will be provided.

Internship Supervisor/Principal Researcher	Dr. Ofir Benjamin
Title of Project/ Name of Laboratory	Alternative proteins and food structure Food sensory
Abstract Students can choose to focus their project on either of the following topics; • Influence of food texture on flavor release from food matrix under oral food condition using robotic model mouth • Moringa protein functionality in food systems • Alternative Protein functionality under different extraction methods in food applications • Using food waste ingredients in food applications like emulsion and gel systems	
Tasks	Involved in performing research using advanced analytical instruments and analyzing the results. Also working at the pilot plant for preparing food samples like emulsions and gels for research purpose
Research impact	The research findings can be used for development of better healthier and more sustainable food products using plant-based proteins or food waste. Also, we will be able to achieve more understanding on how the food sensorial perceived in the mouth through the steps of teeth mastication and oral conditions.
Student requirements	MSc level student who completed BSc degree with score above 7.5. Successfully finished food chemistry, physics and technology courses.
Duration	One semester

Internship Supervisor/Principal Researcher	Prof. Dror Noy
Title of Project/ Name of Laboratory	Design of chlorophyll binding proteins Artificial photosynthesis

Abstract

The lab uses computational protein design techniques to construct building blocks for light energy conversion systems inspired by photosynthesis and using analogues of photosynthetic proteins as well as natural photosynthetic complexes isolated and put outside their native context. The lab uses optical spectroscopic methods to characterize the newly designed proteins. Research projects vary from computational design of novel proteins and their characterization, to combining isolated photosynthetic complexes with various enzymes for driving hydrogen production by light.

Tasks	Recombinant protein expression and purification Protein chromatography and optical spectroscopy Isolation of photosynthetic complexes
Research impact	The research is toward building solar energy systems that may enable production of clean alternatives to fossil fuels
Student requirements	Students should have a good background in biochemistry/molecular biology (preferably with previous hands on experience). Those with good computational skills or good foundations in the physical sciences should find much interest in the methods and may have additional research opportunities
Duration	One semester

For further information and application details, please contact karins@telhai.ac.il

Internship Supervisor/Principal Researcher	Prof. Ofer Shir
Title of Project/ Name of Laboratory	Learning the response surfaces of postharvest functions

Abstract

Postharvest refers to the collection of practices for handling crops immediately following their harvest, with the explicit goal of maintaining their quality, while boosting their shelf-life. Postharvest technologies constitute a cornerstone of modern sustainability, and influence food security directly, with a potentially vast economic impact on the global food supply-chain. Nevertheless, they impose significant scientific challenges concerning treatment protocols for fresh fruit and vegetables. Following a joint study with Dr. Dan Gamrasni (https://doi.org/10.1145/3520304.3533976), an AI capability to derive postharvest treatments for fresh cucumbers was successfully accomplished. One of the next steps is to learn the response surfaces of the fruits, that is, to obtain the prediction capability of certain fruits' functions (e.g., color, mass, stiffness). To this end, learning models are to be applied to the existing empirical observations.

Tasks	R&D of statistical/machine learning models for obtaining meta-modeling of several observed Postharvest functions (e.g., color variation, stiffness deterioration, etc.).
Research impact	This project is part of the campaign to help fight food loss with AI, that is, obtaining AI-driven enhanced postharvest practices. Clearly, such improved postharvest capabilities could increase food stability and availability, making food systems more efficient.
Student Requirements:	BSc in Computer Science / Electrical Engineering / Applied Mathematics
Duration	One semester

For further information and application details, please contact karins@telhai.ac.il

Internship Supervisor/Principal Researcher	Prof. Rachel Amir
Title of Project	Clarifying the pathway in which the bioactive compounds of the pomegranate fruit are formed
Abstract The biosynthesis pathway leading of synthesis of the bioactive compounds found in fruit of pomegranate is unknown yet. To define genes that encode for enzymes in the pathway and study the regultion of the pathway, we locate transcription factors and overexpress or silencing them by using CRISPR-CAS in pomegranate hairy roots. The transgenic roots are examined for their metabolic and transcriptomic profiles to locate the genes involved.	
Tasks	To be determined
Research impact	The goal is to locate genes that cause the formation of the active compound found in the pomegranate. Identification of such genes will help in the cultivation of fruits with high health value. Also an understanding of the transcription factors that control the pathways that compete for the same resources, is an important goal.
Student Requirements	The goal is to locate gourmet genes. The research requires students with a bachelor's or master's degree in biology who have knowledge of molecular biology.
Duration	One semester
For further information and application details, please contact karins@telhai.ac.il	

Internship supervisor/Principal investigator	Prof. M. Iggy Litaor Hydro-geochemistry Lab, MIGAL – Galilee Research Institute & Tel- Hai College
Title of Projects	Phosphorus capture, recycling and utilization for sustainable agriculture and a clean environment using Fe/Organic Composite desalinization treatment residuals (Fe/O-DTR)
Abstract: Phosphorous, a non-renewable resource, has been applied extensively in fields to increase crop yield, yet consequently has increased the potential of waterway eutrophication. The impetus of this proposal is the need to develop an innovative method of P capturing, recycling and reuse that will sustain agricultural productivity while concurrently reducing the level of P discharge from and to agricultural settings.	

We are proposing to test the applicability of a by-product of sea water desalinization plants known as Iron (Fe)-based Desalinization Treatment Residual (Fe-DTR). Fe-DTR is known as an excellent P adsorbent and could be used to recover P from agricultural wastewaters; subsequently, it could be applied to the fields as a P fertilizer. We hypothesize that Fe-DTR behaves as a sink and will adsorb inorganic P (Pi), along with organic P (Po), dissolved organic matter (DOM) and other constituents from agro-organic wastes. We also postulate that the sorption of multiple constituents generates an Fe/Organic Composite (Fe/O-DTR) that will desorb Pi and Po more effectively in the field compared to Fe-DTR, and over time Po mineralization will contribute to the overall pool of plant available P. Moreover, Fe/O-DTR may contribute available Fe to the crops along with P. Our preliminary results strongly support the latter postulation. Consequently, we advance the following research objectives: 1) to develop a thorough understanding of the sorption mechanisms of Pi and Po onto the Fe/O-DTR; 2) to determine the breakthrough range of the composite Fe/O-DTR during P capturing from cowshed wastewater; and 3) to critically evaluate the performance of the composite Fe/O-DTR as a fertilizer using selected plants grown in lysimeters and in test-fields. Our review of the literature and experience indicate that the dual application of Fe-DTR as P mining from organic wastewaters and applying the produced Fe/O-DTR as slow release P fertilizer has never been tested before. The proposed research is divided into five major tasks, starting with sorption-desorption characteristics of Fe/O-DTR composites, followed by fractionation of P pools and advanced spectroscopic analysis of the Fe/O-DTR composites, continuing with small-scale (lysimeter) Fe/O-DTR P addition tests and concluding with large-scale (field plots) Fe/O-DTR P addition experiments.

Tasks	1. Enrichment of Fe/O-DTR composite with P from dairy wastewaters using spiral approach – lab experiment 2. Comparative study using Fe/O-DTR and struvite in screen house: lettuce as a test crop
Research impact	The students will gain in-depth knowledge on P biogeochemistry and possible technologies and methods to alleviate future scarcity in P availability.
Student Requirements	General chemistry, physical chemistry, Intro to soil science and or equivalent.
Duration	Not limited. Depending on resource availability.

For further information and application details, please contact karins@telhai.ac.il

Internship Supervisor/Principal Researcher	Dr. Iris Zohar, Geochemistry and biogeochemistry of water and soil
Title of Project	Effects of heatwave on soil biogeochemistry processes that involve phosphorus, nitrogen and carbon cyclings

Abstract

One of the changes in climate is increased frequency and amplitude of heatwaves (ca. 6-8C sudden increase for a few days). High temperatures can impact the geochemical processes like sorption and desorption, but also impact mineralization. These processes can alter nutrients concentrations and their ratios (e.g., N/P) and GHG emissions. Soils cover and management affect soil humidity which in turn affects the geochemical and biological processes.

Tasks	Laboratory work like soil/sediment incubation processing and chemical extractions and analytical measurements. Biological assays like enzymatic activity. Field samplings of soils/sediment/water.
Research impact	Alterations in P, N and C are important for ecological resilience and for plant nutrition, yet the impact of heatwaves on P solubility and associated N and organic C transformations were hardly studied under heatwave conditions.
Student Requirements	Background in Environmental Sciences (including basic Chemistry, aquatic/soil chemistry)
Duration	About 4 months (one semester)

For further information and application details, please contact karins@telhai.ac.il

Internship Supervisor/Principal Researcher	Ofir Degani, Ph.D. Research Group Leader Molecular Phytopathology Lab
Title of Project	Biological Control of *Fusarium* spp., the Causal Agents of Onion (*Allium cepa*) Basal Rot

Abstract

Fusarium basal rot disease (FBR) is considered a serious threat to commercial onion production in Israel and worldwide. Today, coping means applied in Israel against the disease have limited efficiency and include a four-year crop cycle and disinfecting the soil with metam sodium. At the same time, agricultural tools (harrows, plows, etc.), contaminated equipment, and workers facilitate the spread of the disease to new growth areas, and the field disease incidence in Israel now reaches 8% of yields in heavily infected areas. Infected onions do not always show disease symptoms, and the problem worsens if they arrive at storage facilities, especially since this pathogen genus produces known toxins. In a recent study, four species were isolated in northeastern Israel (Golan Heights) from onion samples from infected fields, identified and characterized: F. proliferatum; F. oxysporum f. sp. cepae; and two lesser-known species as FBR agents, F. acutatum and F. anthophilium. Still, other pathogenic Fusarium species may be involved in FBR, and significant knowledge gaps exist in Israel regarding the disease's nature and distribution and the control methods applied against it. The current study aims at examining the potential of biological control to reduce the damage caused by this disease. See similar work done with another pathogen in our lab: https://www.mdpi.com/2309-608X/7/4/315

More information on the pathogens and the FBR disease in Israel is here: https://www.mdpi.com/2079-7737/9/4/69

Tasks	The current research work aimed at examining the antimicrobial properties of *Trichoderma* species against *Fusarium* spp., the causal agents of the onion basal rot disease in Israel. The experiments set will include various tests to study the selected *Trichoderma* species' ability to decrease *Fusarium* spp. growth. These practices included a confrontation assay, the *Trichoderma* spp. secreted metabolites' effect on the pathogen's development in enriched (solid and liquid) media, potted sprouts biocontrol assays, and more. A real-time PCR (qPCR)-based molecular detection of the pathogen DNA inside the host tissues will be applied to test the treatments' effectiveness.
Research impact	The biological control of Fusarium FBR has never been tested against the Israeli populations of the pathogen. Thus, the research focus has high value and impacts our ability to cope with this emerging diseases.

Student Requirements	B.Sc. in Biology or Biotechnology.
Duration	Ca. 4 months (one semester)
For further information and application details, please contact karins@telhai.ac.il	

Internship supervisor/Principal investigator	Dr. Faiga Magzal/ Prof. Snait Tamir
Title of Projects	The associations between diet, gut microbiota, metabolites and neurobiological disorders (i.e., depression, insomnia, ADHD). A microbiota-based personalized diet as a tool to improve quality of life and wellbeing in older adults.

Abstract:
The gut microbiota consists of trillions of microorganisms that live in the intestinal tract. These microorganisms, mainly comprising bacteria, are involved in functions critical to health and wellbeing. They play a crucial role in food digesting. They are involved in many vital processes that extend beyond the gut, including body metabolism, body weight, immune regulation, and brain functions and mood. The gut-microbiota communicates with the brain through the gut-brain axis (GBA), bidirectional communication between the central and the enteric nervous system, linking emotional and cognitive centers of the brain with peripheral intestinal functions.
The type and amount of macro and micronutrients present in the diet (e.g., dietary fibers, omega-3, phytonutrients) influence the composition of the gut microbiota and the metabolites produced by microorganism metabolism (i.e., short-chain fatty acids (SCFAs)). SCFAs can stimulate the sympathetic nervous system, release mucosal serotonin, and influence memory and learning. In this context, diet manipulation of microbiota may influence behavior, sleep, and depression.

Tasks	GC-MS, LC-MS analysis, involvement in clinical experiments.
Research impact	Improve neuropsychological diseases symptoms by providing a personalized nutrition aiming at changes in the gut microbiota composition and metabolite profile.
Student Requirements	Graduated with a Bachelor of Science degree.
Duration	One semester
For further information and application details, please contact karins@telhai.ac.il	

Internship Supervisor/Principal Researcher	Dr. Itai Opatovsky – Laboratory for Insect Nutrition and Metabolomics
Title of Project	The effect of black soldier fly's symbiotic yeasts on activation of the insect's immune system

Abstract:
Most of the interactions between microorganisms and insects are known from prokaryotic organisms (e.g. bacteria), while an understanding of the interactions between eukaryotic microorganisms (e.g. fungi) and insects is lacking. Because fungi, especially yeast and yeast-like symbionts have intense metabolic complexity and ability, they have the potential to dramatically affect the physiological condition of the insect. They can provide nutrients, such as protein, fatty acids, sterols and vitamins, take part in uric acid and pheromone metabolism, and alter the nutritional conditions of environments. We hypothesis that the symbiotic yeast has also effect on activation of the insect's immune system against pathogenic microorganisms, increasing the production of anti-microbial peptides (AMPs). The black soldier fly (BSF) (*Hermetia illucens*) is our model system for fungi-insect interactions. The BSF is an omnivorous detritivore that is found worldwide, mostly in dumpsters and compost in urban areas. Therefore it is interacting with environment that thrive with microorganisms, some are symbiotic and some are pathogenic. We found that the BSF larvae has core yeast community and supplementing the BSF larvae with these yeast has effect on the life cycle and metabolic pathways of tyrosine and tryptophan. In this project we will test the indirect effect of the symbiotic fungi on activation of the insect immune system, which may help the insect to survive in its harsh natural environment.

Tasks	Rearing black soldier fly larvae and yeast Conducting manipulation experiments with the insects and symbiotic and entomopathogenic fungi Measuring gene expression using RT-PCR of anti-microbial peptides (AMP) by the larvae (include insect dissection, RNA extraction and conducting PCR reactions)
Research impact	This project has novelty in two aspects: understanding the interactions between fungi and their insect's host. Interactions between insect and bacteria are widely studies, however, the interactions with eukaryotic organisms such as fungi are still a black box. In addition, studying the AMP production by insect has high interest recently due to the increase in anti-biotic resistance and the requirement for alternative antimicrobial products.
Student Requirements	Introductory course in Entomology; experience with molecular work (advantage)
Duration	3-4 months (one semester)

Internship Supervisor/Principal Researcher	Dr. Roee Gutman Laboratory of Integrative Physiology
Title of Project	Is obesity in mice postponed under a photic cycle with a period length resembling or shorter than their endogenous circadian rhythm period length

Abstract:

Endogenous rhythms oscillate at a period length (tau) that usually diverts from 24-h yet are readily entrained to the near-tau light-dark cycles (T-cycles). Metabolic disruption is secondary to circadian disruption; specifically, high-fat diet (HFD)-induced obesity (DIO) follows HFD-induced circadian disruption. Accordingly, both phenomena are reversed by time-restricted feeding (TRF) on HFD, without caloric restriction, restoring circadian rhythms. Tau-T-cycle deviation correlates with DIO rates and inversely with lifespan. This supports the 'circadian resonance hypothesis', arguing that a tau-T-cycle deviation results in life-shortening disruptions. Therefore, we aim to examine in wild-type (WT) mice the hypothesis's validity under more realistic conditions, in which T-cycles slightly divert from tau. This never-tested setup better reflects wild-type (WT) mice and humans held under the 'regular' 24-h T-cycle, while their tau is ca. 23.7-h and 24.5-h, respectively. We will also examine whether HFD-induced metabolic disruption is lower under tau-like T-cycle than under the 24-h T-cycle.

Tasks	To be determined
Research impact	While the experimental manipulations do not apply to humans, they suggest that applying environmental, pharmacological, or nutritional agents to enhance the endogenous circadian rhythm robustness and slightly accelerate the endogenous circadian rhythm, thereby attenuating the HFD-induced lengthening in tau, will not affect energy balance under LFD yet may postpone DIO onset, even while ad-libitum feeding on HFD
Student Requirements	BSc or MSc in Animal Science, Biology, Life Science, Biotechnology, etc.
Duration	One semester

For further information and application details, please contact karins@telhai.ac.il

Internship Supervisor/Principal Researcher	Dr. Yori Leshem Plant Development and Adaptation laboratory https://www.migal.org.il/en/Yori-Leshem
Title of Project	Sexual reproduction in plants during global warming
Tasks	Pollen collection -Pollen germination assays -Microscopy observations -Live imaging with confocal microscope -PCR
Research impact	The yield in many crops is dependent on successful pollination, which is damaged by elevated temperatures. The suggested project is expected to increase our basic understandings about the ways pollen cope with heat stress. In addition, it holds the potential to increase the pollen's thermal tolerance, consequently allowing better pollination during global warming conditions.
Student Requirements	An introductory course in plant sciences / plant biology / Botany, is a plus, but not mandatory.
Duration	3-4 months (one semester)
For further information and application details, please contact karins@telhai.ac.il	

Internship Supervisor/Principal Researcher	Dr. Yoni Vortman, Hula Research Center
Title of Project	Avian migration, magnetoreception in animals and the symbiotic magnetic sensing hypothesis. Avian vocalizations and bioacoustics. The lab is located at the "Hula Research Center" which is placed at a major migratory flyway for avian migration. My research focuses on several aspects of avian biology: avian migration and their adaptions to resident or migratory life history. Navigation with emphasis on magnetoreception. For the last we use both the unique ATLAS system and a special experimental room were we manipulate the magnetic field. We also focus on sexual selection and avian song and vocalizations. Please visit my scholar google profile to see updated publications

	https://scholar.google.co.il/citations?user=vBU9aBwAAAAJ&hl=en
Tasks	Capturing, sampling and tracking various bird species. Sampling magneto-tactic bacteria. Recording avian vocalizations
Research impact	As our research deals with basic science, we aim to impact fundamental knowledge in biology and ecology
Student requirements	None – candidates will be interviewed by Dr. Vortman
Duration	Flexible, depends on the project, 1.5 -4 months project
For further information and application details, please contact karins@telhai.ac.il	

Internship Supervisor/Principal Researcher	Dr. Kitty Reemst, a postdoctoral researcher from Netherlands Dr. Or Shahar Principal Researcher
Title of Project	Protein and RNA dynamic in brain cells Molecular mechanisms of learning and memory formation Genomic instability focusing on DNA double-strand break reoair and neurodegenerative disorders

Abstract:

We study molecular dynamics in the brain and mechanisms of mRNA translation control.

Our interests include elucidating molecular mechanisms of memory formation. To define molecular pathways of brain development in health and disease and better understand the mechanisms leading to neurodegeneration, focusing on genomic-instability-related disorders. To reveal molecular networks affecting aging.

Our model systems include cell cultures and zebrafish which are well suited for our aims. We use state of the art microscopy, cell-type-specific proteomics and sequencing combined with computational analysis.

Check out our recent publication in which we developed a transgenic zebrafish line allowing for the labeling of newly-synthesized-proteins in a cell-type-specific manner in neurons.

Join us for exciting, fun science!

Tasks	Research including design participating in lab activities such as lab meetings. Performing experiments and analyzing data. The work in the lab is diverse: Cell culture, zebrafish, state of the art microscopy, RNA sequencing and proteomics

Research impact	Studies of molecular dynamics in the brain and mechanisms of mRNA translation control have the potential to greatly impact our understanding of the brain and its functions. By understanding the mechanisms that control mRNA translation in neurons, we gain insight into how memories are formed and stored. Additionally, these studies could lead to the development of new therapies for neurological disorders such as Alzheimer's disease, as well as a better understanding of the mechanisms underlying synaptic plasticity, the process by which the strength of connections between neurons changes in response to experience. This fellowship will also give the student the opportunity to work with state-of-art imaging systems and molecular biology methodologies.
Student requirements	The main prerequisites are motivation and curiosity and a drive to perform radical fun science. Good team spirit is also useful. Beyond that the skills can be acquired and experience in working with cell-cultures, zebrafish, microscopy, sequencing and computational analysis are great.
Duration	4 months (one semester)
For further information and application details, please contact karins@telhai.ac.il	

Internship Supervisor/Principal Researcher	Prof. Segula Masaphy
Title of Project	Mushroom volatile bioindicators Mineral accumulation by fungal mycelium
Abstract:	
Tasks	
Research impact	
Student requirements	
Duration	3-4 months (one semester)
For further information and application details, please contact karins@telhai.ac.il	