[2021] Academic Performance and Career Plan

This template provides the basis for an annual discussion between you and your Line Manager or their delegate, with the objective of identifying your future career development needs, reviewing your activities and achievements over the past year, and planning your work for the next year. Your Academic Portfolio, available in the Business Intelligence Dashboards in the Staff Portal, will provide you with easy access to some of the teaching and research data that you may wish to use as evidence of your achievements. You will need to complete the form and update your CV, and then submit a copy of both by uploading them in Employee Kiosk under the 'Performance and Career Planning' option from the menu; this should be done prior to meeting with your Line Manager or delegate, in order to facilitate the discussion. Following the discussion and agreement with your Line Manager or delegate, the final version of your plan should be uploaded in Employee Kiosk for final approval by your Line Manager / delegate.

Your Academic Performance and Career Plan document should be aligned with the Academic Capability Framework, with reference to Teaching, Research and Engagement activities. The areas of focus within the Academic Capability Framework will be different for each individual, depending on discipline area, role, academic level, stage of career and achievement relative to opportunity. All academic staff, irrespective of role, are expected to address the Engagement category.

DETAILS			
Staff ID number	226167G	**Title**	Dr.
First name	Benchawan	**Last name**	Wiwatanapataphee
Position title	Associate Professor	**Date commenced at Curtin**	1 January 2015
Faculty and School (or equivalent)	Faculty of Science and Engineering, School of EECMS	**Name of Head of School** (or equivalent)	Tele Tan
Academic level (tick one)		A ☐ B ☐ C ☐ D ☒ E ☐	
Role (tick one)		Teaching & Research ☒ Research Allocation 40 % Teaching Academic ☐ iSoLT Allocation % Research Academic ☐ Teaching Allocation % Other ☐ Click or tap here to enter text.	
Fractional appointment		No ☒ Yes ☐ If yes, what fraction? Click or tap here to enter text.	
Early Career Academic (normally within 5 years of date of award of doctoral degree)		No ☒ Yes ☐ If yes, date of conferral? Click or tap to enter a date.	
Career Breaks (list any periods of more than 6 weeks continuous leave taken over the past year or intended to be taken over the next year)		No ☒ Yes ☐ If yes, list details Click or tap here to enter text.	
Flexible work arrangements (list type(s) of flexibility that were used over the past year or required over the next year e.g. changes in start and finish times due to carer responsibilities)		No ☒ Yes ☐ If yes, list details Click or tap here to enter text.	

Career Development

Think about your overall career trajectory and where you would like to progress with your career in the next 3 years. What support might you need to get there, and what might impede your progress?

3-YEAR CAREER DEVELOPMENT PLAN

What are your career aspirations over the next 3 years?

I will contribute to international collaboration for articulation programs with universities in Thailand (Mahidol University and MAEJO University) and China, and continue to have another articulation partner, King Mongkut North Bangkok University. I will also make substantial contribution to achieve research excellence and publish research papers in top journals

What do you see as the present challenges and opportunities in advancing your career?

Mathematical research problems for the 21st century have involved machine learning that are at the forefront of the modern **data science** and artificial intelligence. The research includes a balanced **combination** of **mathematical** foundations, such as advanced numerical analysis (FEM), advanced linear algebra, **optimization**, high-dimensional statistics, etc. As I have solid knowledge in these mathematical foundations, it is a great opportunity to have more PhD students in development of deep learning algorithms for solving PDEs.

What professional development opportunities do you propose, in order to advance your career development or to address any gaps in your breadth of experience?

I propose to have *professional development opportunities in the* leadership training such as Online course for professional development, leadership + management and collaboration at https://learning.linkedin.com/

[2021] Review of Achievements

In reviewing your activities over the last 12 months, did you achieve everything that was in your Work Plan from the previous year? Were you supported in reaching your milestones / achievements? What other achievements would you like to highlight, including a review of your principal achievements over the last 3 years?

For new employees, or if you have not participated in a conversation previously, review your work to date and identify highlights, key achievements and opportunities.

PERFORMANCE REVIEW

TEACHING

If you are a Teaching Academic, you will need to include iSoLT (Innovation and Scholarship of Learning and Teaching) activities as part of your review.

Build teaching capability

1. **Unit coordinator for 3 units:**
   - INDE2000 Supply Chain Modelling and Optimisation (UG) semester 1
   - INDE5000 Supply Chain Modelling and Optimisation (PG) semester 1
   - MATH5004 Advanced Numerical Analysis semester 2
   - Advanced Topics in Applied and Computational Mathematics at YANSHAN University (UG)

2. **Teaching:**
   - INDE2000 Supply Chain Modelling and Optimisation (UG) semester 1
   - INDE5000 Supply Chain Modelling and Optimisation (PG) semester 1
   - MATH5004 Advanced Numerical Analysis semester 2
   - Advanced Topics in Applied and Computational Mathematics at YANSHAN University (UG)

3. **Project Supervision**:
   - STAT4000 Actuarial Science Honours Dissertation 1
     - 19003276 Sim Kendrick Geng Yi "Stock market prediction using a data-driven methodology based on neural network machine learning"
   - STAT4001 Actuarial Science Honours Dissertation 2
     - 19003276 Sim Kendrick Geng Yi "Stock market prediction using a data-driven methodology based on neural network machine learning"
   - MATH3004 Industrial project (1 UG) students) Semester 2
     - 19394103 Wai Kin Yee "Road Traffic Modelling"
   - MATH6004 Industrial Engineering Masters Project
     - Supervision of the master's project by D Patel

4. **PhD Supervision:**
   - **One Graduate PhD student in 2020**:
     - 12176016 Nan Li (co-Supervisor)

   - **Six PhD** students **are ongoing:**
     1) 19068291 Fahad Mesfer M Aljuaydi (Supervisor)
     2) 19190107 Manlika Ratchagit (Supervisor)
     3) 19711812 Chuanye Gu (co-Supervisor)
     4) 18280036 Otaif Amani Ahmed A (co-Supervisor)
     5) 19185501 Nabubie Bashiruddin (co-Supervisor)
     6) 19702159 Zhang Liyuan (co-Supervisor)

Provide excellent teaching and student support

1. Teaching Evaluation:
   Semester 1
   - INDE2000 Supply Chain Modelling and Optimisation: (no results due to low rate of response)
   - INDE5000 Supply Chain Modelling and Optimisation
     Teaching evaluation: Response rate: 75%
     1. The learning outcomes in this unit are clearly identified. (100%)
     2. The learning experiences in this unit help me to achieve the learning outcomes. (100%)
     3. The learning resources in this unit help me to achieve the learning outcomes. (100%)
     4. The assessment tasks in this unit evaluate my achievement of the learning outcomes. (100%)
     5. Feedback on my work in this unit helps me to achieve the learning outcomes. (100%)
     6. The workload in this unit is appropriate to the achievement of the learning outcomes. (100%)
     7. The quality of teaching in this unit helps me to achieve the learning outcomes. (100%)
     8. I am motivated to achieve the learning outcomes in this unit. (100%)
     9. I make best use of the learning experiences in this unit. (100%)
     10. I think about how I can learn more effectively in this unit. (100%)
     11. Overall, I am satisfied with this unit. (100%)

     evaluate Full Unit Report
     - INDE5000 Supply Chain Modelling and Optimisation (PG) semester 1
       Overall, 100% Response rate 75%

   Semester 2 (Reports will be available from 11/12/2020
   - MATH5004 Advanced Numerical Analysis
     Teaching evaluation: Response rate: 67%
     1. The learning outcomes in this unit are clearly identified. (100%)
     2. The learning experiences in this unit help me to achieve the learning outcomes. (100%)
     3. The learning resources in this unit help me to achieve the learning outcomes. (100%)
     4. The assessment tasks in this unit evaluate my achievement of the learning outcomes. (100%)
     5. Feedback on my work in this unit helps me to achieve the learning outcomes. (100%)
     6. The workload in this unit is appropriate to the achievement of the learning outcomes. (100%)
     7. The quality of teaching in this unit helps me to achieve the learning outcomes. (100%)
     8. I am motivated to achieve the learning outcomes in this unit. (100%)
     9. I make best use of the learning experiences in this unit. (100%)
     10. I think about how I can learn more effectively in this unit. (100%)
     11. Overall, I am satisfied with this unit. (100%)

     evaluate Full Unit Report
     - IMATH5004 Advanced Numerical Analysis
       Overall 100% Response rate 67%

2. Unit improvement and development: All unit materials mentioned above have been revised and implemented.
   - INDE2000(5000): Online Quizzes to test students' knowledge on control problems, optimisation, inventory management and demand forecasting.
   - MATH5004: Video Lectures and Tutorials

Line Manager's (or delegate) comments:

As in previous year, Benchawan has made significant contribution in her teaching having been the unit coordinator for three units this year, both onshore and offshore. The achievement of outstanding student feedback via eVALUate on these units has been very impressive (i.e. 100% student satisfaction rate with a

convincing 75% response rate). In addition to her coursework teaching, Benchawan is active in project supervision at undergraduate and postgraduate levels. Benchawan has continued to build collaboration opportunities with international universities like Mahidol University, MAEJO University and King Mongkut's University of Technology Thonburi..

Is overall teaching performance satisfactory? If no, please elaborate below. No ☐ Yes ☒

Click or tap here to enter text.

RESEARCH

If you are a Teaching Academic, you may wish to leave this section blank.

Build research capability

The research 2021 output for 2021 is in the following areas:

- Hybrid models for freeway traffic control using ramp metering and variable speed limits.
- Non-linear Optimization model for traffic flow control and management under non-recurrent events.
- Multivariable deep learning approach for traffic prediction under non-recurrent events.

Initiate and sustain programs of 'researcher-driven' and/or 'demand-driven' research

Grant: ARC Linkage Project Number LP170100341 "Improving Road Network Operations under Non-Recurrent Events" from September 2018 to August 2022. The partner organisation is MAINROADS WA (MRWA) providing traffic data and information of new network design. Funding is being used for travel expenses, paper publication and 2 scholarships for Curtin PhD students.

The project aims to develop an innovative approach for improving Road Network Operations (RNO) under non-recurrent events through analysis of big data.

The project started in September 2018. A Kick-off meeting was held at the Road Network Operations Centre of MRWA with MRWA, NSW RMS and SBEnrc on 07 November 2018. A large volume of data on traffic flow (10 months) and rainfall (3 months) have been collected. A computer program package has been developed for processing the data by using the PYTHON programming language.

Variations of traffic demands onto the Kwinana Freeway through a selected on-ramp have been analysed. The features of traffic flow on two different freeway links have been investigated. The influence of rainfall on road accidents and the impact of rainfall and road incidents have been analysed. The results obtained from this study indicate that: there is a little impact of rainfall on traffic incidents on the Kwinana Freeway; both rainfall and incidents have significant impact on the traffic flow; freeway accidents during rainfall have a more significant impact on traffic flow conditions.

Following a comprehensive literature review, various microscopic and macroscopic traffic flow models have been constructed and evaluated. A computer model for the Kwinana Freeway network including on-ramps and off-ramps has been developed. Real-time traffic data from 1 January 2018 to 1 Nov 2018 are being used for simulating the traffic behaviour. The computer program based on a microscopic model mimics the movement of individual vehicles from all source detectors including on-ramps, to all sink detectors, including off-ramps. The microscopic model simulates the flow behaviour between the traffic assignment zones and the routes between them. Our simulated traffic data is recorded during peak hours in the morning and evening, and the results compare well with the historical data from MAINROAD WA.

Generate value and impact through research outputs

Research papers:

1) X Zhang, J Jiang, Y Wu, B Wiwatanapataphee (2021) Iterative properties of solution for a general singular n-Hessian equation with decreasing nonlinearity, Applied Mathematics Letters, 106826.

   Significance: In this paper, we consider the iterative properties of solution for a general singular n-Hessian equation with decreasing nonlinearity. By introducing a double iterative technique, we firstly establish the criterion of the existence for unique solution, and then study the convergence properties of solution as well as error estimation and the convergence rate between iterative value and exact solution. Different from the existing work, the nonlinear term here is a non-increasing function with high singularity at some time and space variables.

2) X Zhang, L Liu, Y Wu, B Wiwatanapataphee, Y Cui (2021) Solvability and asymptotic properties for an elliptic geophysical fluid flows model in a planar exterior domain, Nonlinear Analysis: Modelling and Control 26 (2): 315-333
   Significance: In this paper, we study the solvability and asymptotic properties of a recently derived gyre model of nonlinear elliptic Schrödinger equation arising from the geophysical fluid flows. The existence theorems and the asymptotic properties for radial positive solutions are established due to space theory and analytical techniques, some special cases and specific examples are also given to describe the applicability of model in gyres of geophysical fluid flows.

3) Y Zhang, L Liu, Y Wu, B Wiwatanapataphee (2021) Multiple solutions for a modified quasilinear Schrödinger elliptic equation with a non-square diffusion term, Nonlinear Analysis: Modelling and Control, 26(4): 702-717
   Significance: In this paper, we establish the results of multiple solutions for a class of modified nonlinear Schrödinger equation involving the p-Laplacian. The main tools used for analysis are the critical points theorems by Ricceri and the dual approach.

4) Y Yang, S Liu, Y Wu, B Wiwatanapataphee (2021) Pricing of volatility derivatives in a Heston–CIR model with Markov-modulated jump diffusion, Journal of Computational and Applied Mathematics, 393 : page 113277.
   Significance: This paper concerns the pricing of volatility and variance swaps with discrete sampling times using a hybrid Heston–CIR model with Markov-modulated jump–diffusion. We extend the regime-switching Heston stochastic volatility model by further considering the Cox–Ingersoll–Ross (CIR) stochastic interest rate with jump diffusion. The market parameters, including the jump–diffusion part, are modulated by a continuous-time Markov chain that represents different market states. The proposed hybrid model can capture the stochastic property of volatility rate, interest rate as well as the short-term and long-term effects on the financial market caused by unexpected events and structural changes of the macroeconomic environment respectively. The fair strike prices of variance swaps and volatility swaps based on four different formulae for the realized variance (volatility) are obtained by utilizing the characteristic function.

Line Manager's (or delegate) comments:

Benchawan has a current ARC Linkage grant in road network operations and optimisation with Mainroads WA. She is strongly encouraged to take advantage of this partner to explore new funding opportunities through PATREC and the iMOVE CRC. I will be introducing Benchawan to Prof Sharon Biermann of PATREC in the new year.
Benchawan's plan to incorporate machine learning into her research in data analytics would provide the opportunity to expand her research and will enable her to develop further collaborations with other researchers (i.e. Computing) as well as the other centres and institutes that are affiliated to the school. She is also keen to re-establish her research links with key universities in Thailand in this area of research.

Is overall research performance satisfactory? If no, please elaborate below. No ☐ Yes ☒

Click or tap here to enter text.

ENGAGEMENT

Foster a positive and inclusive workplace environment

Monthly meeting

- Occupational Health and Safety (OHS)
- People and Space Management
- Teaching and Collaboration Operation

Advance the profession and discipline

1. Refereeing ARC Project
   - 2 DE Projects
   - 4 DP Projects
2. Refereeing papers
   - Alexandria Engineering Journal
   - Applied Thermal Engineering. (Elsevier)
   - Cogent Mathematics
   - Journal of Physical Science
   - Hindawi
3. Serving Committees:

- Assistant postgraduate coordinator to evaluate a number of post graduate student applications for Maths & Stats discipline
- Member of Curtin Institute for Computation (Simulation) at https://computation.curtin.edu.au/research/researchers/simulation/
- Member of Editorial board of international journal of multivariate data analysis (IJMDA)
- Member of Editorial board of Cogent Mathematics and Statistics https://www.cogentoa.com/journal/mathematics-and-statistics/editors

Collaborate with external stakeholders

Research Collaboration with MAINROADs WA & NSW:

"Improving road network operations under non-recurrent events" from 03/09/2018 to 02/09/2022

Investigators

- Prof Yong Hong Wu (Chief Investigator – Curtin University)
- Prof Sherif Mohamed (Chief Investigator- The University of Queensland)
- A/Prof Benchawan Wiwatanapataphee (Chief Investigator- Curtin University)
- Mr. Craig Moran (Partner Investigation – MAINROAD NSW)
- Mr. Jacob Graham (Partner Investigation – MAINROAD WA)

Strengthen connections with global partners and campuses

1. Articulation programs between Mahidol University and Curtin University:
   - Assistant articulation-program coordinator for 2 degrees
     i. Bachelor of Science (Actuarial Science)
     ii. Bachelor of Science (Industrial Optimisation)
2. Articulation programs between Majoe University and Curtin University:
   - Articulation-program coordinator for Bachelor of Science (Industrial Optimisation)

Line Manager's (or delegate) comments:

Benchawan's professional engagement extends to both industries and academia where she successfully used her influences and skills to maximum the outcomes in teaching and research. Further to this, she would like to focus her engagement activity to develop cross disciplinary and institution collaborations. I strongly encourage her to further her active work in forging articulation programs with international universities.

Is overall engagement performance satisfactory? If no, please elaborate below. No ☐ Yes ☒

Click or tap here to enter text.

[2022.] Work Planning

List the principal activities and achievements you have planned for the next year, taking into account your review of the past year's achievements and your own career objectives. Your proposed activities and achievements should be aligned with the Academic Capability Framework.

WORK PLAN

TEACHING

If you are a Teaching Academic, you will need to include iSoLT (Innovation and Scholarship of Learning and Teaching) activities as part of your work plan.

Build teaching capability

Unit coordinator:

1) INDE2000 Supply Chain Modelling and Optimisation UG level semester 1
2) INDE5000 Supply Chain Modelling and Optimisation PG level semester 1
3) MATH2002 Computational Mathematics UG semester 2
4) MATH5004 Advanced Numerical Analysis semester 2
5) Advanced Topics in Applied and Computational Mathematics at Yunshan University (UG)

Teaching: Lecturer-in-charge

1) INDE2000(5000) Supply Chain Modelling and Optimisation UG (PG) level semester 1,
2) MATH2002 Computational Mathematics semester 2
3) MATH5004 Advanced Numerical Analysis semester 2
4) Advanced Topics in Applied and Computational Mathematics at Yunshan University (UG)

Teaching: Workshop duty

- MATH1014 Foundations of Calculus

Teaching: Moderation & Co-assessor duty

- STAT2005 Computer Simulation

Project Supervision

- MATH6004 Industrial Engineering Masters Project
- MATH3004 Industrial Project

PhD Supervision:

- Five PhD students are ongoing:

1) 19068291 Fahad Mesfer M Aljuaydi (Supervisor 60%)
2) 19190107 Manlika Ratchagit (Supervisor 50%)
3) 19711812 Chuanye Gu (co-Supervisor 40%)
4) 18280036 Otaif Amani Ahmed A (co-Supervisor 40%)
5) 19185501 Bashiruddin Nabubie Ibra(Associate 20%)
6) 19702159 Zhang Liyuan (co-Supervisor 40%)

RESEARCH

If you are a Teaching Academic, you may wish to leave this section blank.

See attached Research Plan

ENGAGEMENT

Advance the profession and discipline

Refereeing ARC Project at least 1 project
Refereeing papers at least 1 paper
Serving Committees:

- Assistant postgraduate coordinator to evaluate a number of post graduate student applications for Maths & Stats discipline
- Member of Curtin Institute for Computation (Simulation) at https://computation.curtin.edu.au/research/researchers/simulation/
- Member of Editorial board of international journal of multivariate data analysis (IJMDA)
- Member of Editorial board of Cogent Mathematics and Statistics https://www.cogentoa.com/journal/mathematics-and-statistics/editors

Collaborate with external stakeholders

Research Collaboration with MAINROADs WA & NSW:
"Improving road network operations under non-recurrent events" from 03/09/2018 to 02/09/2022

Strengthen connections with global partners and campuses

Articulation programs between Mahidol University and Curtin University:

- Assistant articulation-program coordinator for 2 degrees: Bachelor of Science (Actuarial Science) and Bachelor of Science (Industrial Optimisation)

Articulation programs between MAJOE University and Curtin University:

- Articulation-program coordinator for Bachelor of Science (Industrial Optimisation)

LEAVE PLANS

When do you propose to take your 4 weeks annual leave?

1 week in January, 3 weeks in December

What other leave (e.g. Long Service Leave) plans do you have in the coming year?

Not applicable

ACKNOWLEDGEMENT

This Academic Performance and Career Plan document has been discussed and agreed with my Line Manager (or their delegate).

Line manager (or delegate) name	Tele Tan	**Date**	21/12/2021
Staff member name	Benchawan Wiwatanapataphee	**Date**	14/01/2022

Do you have any comments or feedback you wish to add about the conversation that you have had with your Line Manager (or delegate)?

Click or tap here to enter text.