NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

Reg. No. 200604393R

International Summer School 2024

offered by

School of Mechanical and Aerospace Engineering
Nanyang Technological University, Singapore

July 21 to July 28, 2024

About NTU's School of Mechanical and Aerospace Engineering

The School of Mechanical and Aerospace Engineering (MAE) is ranked **11th** in the world (**QS** Subject ranking 2023) and prides itself in its excellent research capabilities in areas including *mechanical engineering*, *robotics*, *advanced manufacturing*, *aerospace*, *energy*, *biomedical*, *industrial engineering*, and *maritime engineering* etc. With a faculty comprising more than 90 professors, it is one of the largest mechanical engineering schools in the world. Faculty members provide a wealth of collective expertise in traditional and emerging mechanical and aerospace engineering, and in specialties including advanced manufacturing, mechatronics, innovative design, nanotechnology, and biomedical and computational applications. MAE is equipped with state-of-the-art research infrastructure, housing a comprehensive range of cluster laboratories, test bedding facilities, research centres and corporate laboratories.

Established since 1981, the school has evolved and established a wide-reaching community globally. Click on this MAE40 commemorative book to learn more about the historical development and evolution of the School over the years.

About the International Summer School 2024

The Summer School 2024 is a short but intensive enrichment programme offered by the School of Mechanical and Aerospace Engineering (MAE) at Nanyang Technological University (NTU). We invite university students from anywhere in the world to come to Singapore to learn directly from professors who are leading experts in their respective fields.

During the programme, students will attend lectures by our faculty members to learn the latest research and technology that include *additive manufacturing, precision engineering, lasers and optics in the 4th industrial revolution, robotics, autonomous systems* etc. Students will also visit various laboratories and research facilities that include *Robotics Research Centre*, and *Singapore Centre for 3D Printing* at NTU. Hands-on workshops will be conducted, and students will have first-hand experience to design, make/simulate, and experiment with various engineering creations.

Throughout the programme, students will have opportunities to interact directly with our professors and other students in a rich multi-cultural environment. **Certificates** will be awarded to students upon successful completion of the programme. Outstanding students will be invited to apply for the **MSc, MEng or PhD programmes** offered by MAE, NTU.

Programme Structure

Over the course of this short but intensive programme, you will complete the following activities exclusively curated for your learning experience:

- Lectures on latest research on Robotics and AI.
- Hands-on workshop on Robotics and Autonomous Systems.
- Lectures on latest research on Precision Engineering and Additive Manufacturing.
- Hands-on Workshop on Laser technology, 3D Printing and Bioprinting.
- Visits of labs and research centres.
- Close interaction with professors and local students.
- Cultural exploration of Singapore.

The general programme flow is detailed below.

Date	Activity
Sunday 21 July	Arrival in Singapore Hotel check-in.
Monday 22 July	AM: Welcome, orientation and campus tour of NTU (Dr Chen Songlin, MAE Graduate Student Club) PM: Laser Technology and Precision Engineering (Prof Murukeshan Vadakke Matham)
Tuesday 23 July	AM: Additive Manufacturing and 3D Printing (Prof Yeong Wai Yee) PM: Hands-on workshop with Bioprinting (Prof Yeong Wai Yee)
Wednesday 24 July	AM: Advanced inspection technology, Sensors, and Industry 4.0 (Prof Fan Zheng, David) PM: Assistive Robotics (Prof Domenico Campolo)
Thursday 25 July	AM: Autonomous Systems and Human-Machine Systems (Prof Lyu Chen) PM: Hands-on Workshop on Autonomous Mobile Robots (Prof Lyu Chen)
Friday 26 July	AM: Intelligent Materials and their Applications in Soft Robotics (Prof Wang Yifan) PM: Presentation of Certificates, Graduate Studies @MAE (Dr Chen Songlin)
Saturday 27 July	Day: Cultural exploration Evening: Farewell Dinner & Networking
Sunday 28 July	Hotel Check-out Departure from Singapore

Note: the final schedule of the programme is subject to change based on faculty availability.

In the evenings outside of learning hours during the Summer School, participants are free to explore Singapore with your schoolmates! Participants will be provided with a comprehensive list of recommended sites, activities and instructions on travelling, from Summer School facilitators.

Who should apply?

Academic background: Students enrolled in Bachelors' degree programmes, preferably in engineering related subjects, with at least 2 years of university experience are welcome to apply. Students who are interested in pursuing graduate studies at MAE, NTU (including MSc, M.Eng. and PhD) are strongly encouraged to apply.

English requirement (meeting any of the following criteria): TOELF 76, IELTS 6.0, Band-4 450, Band-6 430. Applicants without English scores may be selected for online interviews.

Where will you be based, and how to get around?

Lectures, workshops, and immersive group learning activities will be conducted on NTU campus. Accommodation will be provided (*inclusive of daily breakfast*) at a hotel in a convenient location in Singapore. Transportation will be provided daily to campus and back to the hotel.

What will you learn and get out of the programme?

The expected learning outcomes of the Summer School include:

(1) Research Exposure – participants will learn the latest research findings and technology development on a wide range of topics, with special focus on *Robotics*, *Smart Manufacturing* and *Industrial use of AI*.

(2) Practical Skills – participants will have plenty of opportunities to apply engineering theories for practical problem solving and system creation via guided lab visits and hands-on workshops.

(3) Immersive Experience – participants will be immersed in the learning & living environment at NTU to experience multi-cultural and multi-disciplinary research and study.

(4) Social Networking – participants will have extensive opportunities to interact closely with professors and students at NTU and participants from other institutions, cultivating cross-border friendships and fostering collaboration.

Upon successful completion of the International Summer School 2024, participants will be presented with a **Certificate of Participation**, endorsed by the School of Mechanical and Aerospace Engineering. **Referral letters** could be issued by individual faculty members and/or programme administrators based on the academic performance of participants during the Summer School.

How much will it cost?

In 2024, the summer school will cost **SGD3,000** inclusive *accommodation*, *workshops*, *lectures*, *group activities* and *transport* during the Summer School. Flights, meals (*other than the breakfast included in hotel*), expenses on personal activities during free-and-easy time, and insurance are NOT included in the fees.

How to apply?

Interested students can submit applications through the International Office of your University. Applications will be evaluated, and official offer letters will be issued to successful applications. Official invitation letters and other supporting documents will be provided if visa is required to attend the programme.

Application deadline: **April 21, 2024.**

Any questions?

If you have any questions concerning the Summer School, please write to:

Mae.msc@ntu.edu.sg

We look forward to welcoming you to MAE of NTU!

Faculty Profiles

Associate Professor Domenico Campolo

Associate Professor Domenico Campolo received the Ph.D. degree in microengineering from Scuola Superiore Sant'Anna, Pisa, Italy. He is currently the Director of the Robotics Research Centre, School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore. He is also the Co-Founder of ArtiCares Pte Ltd., an international company specializing in rehabilitation and assistive robotics. His research interests are: Human-Robot Physical Interaction, Robot-aided Neuro-Rehabilitation and Assessment, Computational Neuroscience, Geometric Methods in Robotics and Control and Bio-inspired and Human Robotics.

Associate Professor Fan Zheng, David

Associate Professor David Fan earned his Ph.D. degree in Mechanical Engineering from Imperial College London. He leads a research team dedicated to developing novel techniques for the non-destructive evaluation, structural health monitoring, and sound manipulation. His work integrates advanced physics and modeling techniques with the development of technologies that can be rapidly deployed in practical settings. In 2018, Dr. Fan was awarded the Achenbach Medal for his outstanding contributions to structural health monitoring. In 2023, he was ranked among the world's top 2% of scientists by Stanford University. Dr. Fan also serves as an Associate Editor for "Structural Health Monitoring – An International Journal" and "Ultrasonics," two leading journals in his field.

Associate Professor Lyu Chen

Associate Professor Lyu Chen received his Ph.D. degree from Department of Automotive Engineering, Tsinghua University, China in 2016, with a joint PhD from EECS Dept., University of California, Berkeley, USA. He is Director of Automated Driving and Human-Machine System (AutoMan) Research Lab, Cluster Director in Future Mobility Solutions at ERI@N, the Thrust Lead in Smart Mobility and Delivery at Continental-NTU Corp Lab, and the Program Lead in Next Generation AMR, Schaeffler-NTU Joint Lab. His research focuses on autonomous driving, human-machine collaboration, robotics, and Cyber-Physical Systems.

Associate Professor Murukeshan Vadakke Matham

Associate Professor Murukeshan Vadakke Matham obtained his M.Sc. and M.Phil. Degrees in Physics with specialization in Quantum Electronics from the Cochin University of Science and Technology, India. He pursued his doctoral studies at the Indian Institute of Technology, Madras and at the University of Oldenburg, Germany with the DAAD Fellowship award and received Ph.D in 1997 . Prof Murukeshan has made pioneering contributions in optical imaging, won over 20 international awards or recognitions, and is well known for imaging from macro to micro to nanoscale. His major research expertise is in the areas of Nanoscale Optics (conventional and near-field interferometric lithography; plasmonics), Biomedical Optics (specialty multi-modal and hybrid modality probes, imaging and sensing), and Applied Optics for macro, micro and nanoscale metrology. He has supervised over 25 awarded PhD theses and has over 200 international journals publications including 7 nature publication group journals and over 180 international proceedings/conference papers. He is a fellow of SPIE, Fellow of OPTICA, Fellow of Institute of Physics (UK) and distinguished Fellow of OSI. Many of his research was covered by print and visual media around the world. He is currently serving as the Director of Centre for Optical & Laser Engineering, NTU and Deputy Director of The Photonics Institute, NTU. Prof Murukeshan is also the Programme Director of NTU's Master of Science in Smart Manufacturing programme.

Assistant Professor Wang Yifan

Assistant Professor Wang received his Ph.D. in Soft Matter Physics from The University of Chicago, USA, and B.S. in Physics from Peking University, China. His research interests focus on design and manufacturing new classes of robotic materials with unprecedented capabilities of sensing, responding to and communicating with their surrounding environment, by incorporating soft matter building blocks such as granular particles, colloids and nanoparticles. The applications of Dr. Wang's research extend from smart fabrics for exoskeleton and haptic perception, microscale shape-changing robots, to active phononic metamaterials. He has published papers in top research journals including Nature, Matter, Nature Materials, Physical Review Letters, Nano Letters, ACS Nano, Advanced Materials, Small, Extreme Mechanics Letters, etc. He has won numerous awards such as Grainger Foundation Fellowship in Experimental Physics, and Nanyang Assistant Professorship Award. His work has been widely covered by global media sources.

Professor Yeong Wai Yee

Professor Yeong received her BEng and PhD degrees in Mechanical and Aerospace Engineering from the Nanyang Technological University. As the programme director for the Singapore Centre for 3D Printing and the HP-NTU Digital Manufacturing Corporate Lab, she led a team of specialists in 3D bioprinting and functional materials printing. Their international recognition is a testament to their innovative work, with several projects paving the ways towards integration into industry applications to enhance processes and create novel devices. Her research interests include 3D printing of new materials, hybrid electronic-mechanical structures and bioprinting for tissue engineering. She was listed as one of the World's top 2% most-cited scientist 2021-2023 by Stanford University. For her efforts, Prof Yeong was acknowledged as one of Top 50 Asia Women Tech Leaders in 2024.