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2025 SCUT GLOBAL SUMMER SCHOOL OF EMERGING ENGINEERING

Contact

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This is to invite your students to join our 2025 SCUT Global Summer School of Emerging Engineering (GSSEE). GSSEE will be held in Guangzhou, China from 6th July to 20th July, 2025. Together with students, your faculty members are also welcomed to deliver a course in the selected areas in the course description.

WELCOME

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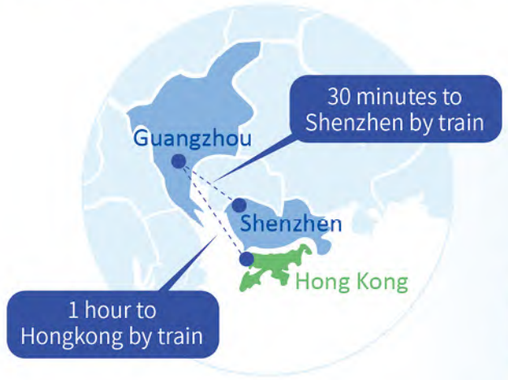
2025 SCUT GSSEE

About Guangzhou

Guangzhou is a metropolitan city with a history of over 2,000 years, the third largest city in China.



Location

Culture

Since ancient times, Guangzhou is the center for culture of Lingnan region, especially well-known for its dialect, opera, carving and embroidery, architecture etc.

Food

Cantonese cuisine is one of the four cuisines in China, renowned for its clearness, freshness, and true to original flavor. Meanwhile, you will also find plenty of restaurants with cuisines from almost all around the world.

About SCUT

Situated in Guangzhou, the heartland of the dynamic Guangdong–Hong Kong–Macao Greater Bay Area, South China University of Technology is a prestigious research university renowned for engineering and coordinated multi-disciplinary development across science, engineering, and medicine.

With the mission of revitalizing the nation through industrial development, SCUT traces its roots back to Guangdong Provincial First-Class Industrial School established in 1918. Then in 1952 it officially reconstructed into South China Institute of Technology, one of the first four institutes of technology in China then. Recognized for its excellence, SCUT has been among the national Project 211, Project 985, and Double-First-Class universities. The university now encompasses three campuses within the same city.

Committed to being a world-class institution of higher learning, SCUT ranks among the top 400 in the four leading global university rankings, with food science and technology, polymer science being No.1 worldwide released by US News 2023. There are 16 disciplines listing top 1% by 2024 Essential Science Indicators (ESI) Global Ranking, with materials science, chemistry, agricultural science, and computer science being in the top 0.1%, and engineering, in particular, in the top 0.01%.

Highlights

Committed to being a world-class institution of higher learning, SCUT ranks among the top 400 in the four leading global university rankings.

ESI Global Rankings 2024

16 subjects ranking in the top 1%, 5 of which in the top 0.1%, and engineering out of the five in the top 0.01%

Engineering	Chemistry	Computer Science	Materials Science	Agricultural Science

- Mathematics
- Social Science, General
- Pharmacology & Toxicology
- Physics
- Environmental Ecology
- Clinical Medicine
- Biology & Bio-chemistry
- Geoscience
- Plant & Animal Science
- Molecular Biology & Genetics
- Economics & Business

ARWU Global Ranking of Academic Subjects 2023

#3	Food Science & Technology
#7	Textile Science & Engineering
#8	Energy Science & Engineering
#10	Chemical Engineering
#16	Nanoscience & Nanotechnology
#21	Mechanical Engineering
#24	Materials Science & Engineering
#24	Biotechnology
#25	Chemistry
#25	Instruments Science & Technology
#31	Telecommunication Engineering
#39	Transportation Science & Technology
#41	Automation & Control
#42	Computer Science & Engineering
#45	Civil Engineering
#47	Marine/Ocean Engineering
#48	Biomedical Engineering
#49	Electrical & Electronic Engineering

US NEWS Subject Rankings 2023

#1	Food Science & Technology
#1	Polymer Science
#4	Agricultural Sciences
#9	Chemical Engineering
#12	Energy & Fuels
#21	Physical Chemistry
#21	Nanoscience & Nanotechnology
#24	Chemistry
#27	Condensed Matter Physics
#28	Mechanical Engineering
#28	Engineering
#30	Electrical & Electronic Engineering
#39	Materials Science
#39	Artificial Intelligence

About GSSEE

Program Overview

GSSEE consists of four parts: academic courses, cultural courses, lectures, and field trips. This program welcomes both undergraduate and graduate students across the world. The courses will be co-delivered by professors from SCUT and renowned overseas universities, offering an immersive environment of international learning and Chinese culture, enabling your embrace of charming Guangdong- Hong Kong-Macao Greater Bay Area.

Academic Courses

» Advanced Materials of Soft Matter and Biomedicine
» Artificial Intelligence and High-end Manufacture
» Chemistry and Chemical Engineering
» Electricity market and advanced power transmission technology (only for students from Imperial College London)
» All courses are flexible and open to be customized.

Contents

» Academic courses (by professors of SCUT & partner universities)
» Cultural courses (including Chinese Kungfu, Calligraphy, Cloisonne enamel etc.)
» Lectures (by professors of renowned universities like Oxford, Harvard, MIT, Princeton etc.)
» Field Trips (including leading companies like Tencent, China Mobile, GAC Aion New Energy Automobile etc.)

Application

Applicants: Junior & senior undergraduates and graduates will be accepted with priority

Website: https://scut.17gz.org/

Program Period: July 6-20, 2025 (2 weeks)

Deadline: May 1st, 2025

Fees

Application and tuition fees are waived, round airfare and local expenses shall be self-covered (accommodation around 1000 RMB for each)

* Allowances for partner university's faculty: Round airfare for economic class & accommodation are covered (applicable to faculty who co-teaches courses)

Location

SCUT Guangzhou International Campus (GZIC) GZIC offers the advanced global education and premier resources, equipped with modern facilities and comfortable environment, incorporating both eastern and western elements.

Program Schedule

Date	Activity
Day 1	Arrival
Day 2	Opening Ceremony & Orientation Ice breaking
Day 3	Academic Course Field Trip – GAC AION
Day 4	Academic Course Lecture – China's Economic Window – The Great Pearl River Delta (GPRD) Region
Day 5	Academic Course Cultural Course
Day 6	Free Time Field Trip - Tencent
Day 7	Academic Course Cultural Course
Day 8	Cultural Course Lecture – Fundamental Physics and AI
Day 9	Free Time
Day 10	Academic Course Cultural Course
Day 11	Academic Course Field Trip – China Mobile Guangzhou
Day 12	Academic Course Field Trip – Guangzhou Urban Planning and Exhibition Center
Day 13	Academic Course City Tour (Yongqing Fang & Pearl River Night Cruise)
Day 14	Academic Course City Tour (Guangdong Museum & Chen Clan Academy)
Day 15	Closing & Departure

* The current schedule may be adjusted according to the real situations.

Academic Courses

Advanced Materials of Soft Matter and Biomedicine

Tissue Engineering and Artificial Organ

This course is aimed at covering the important multi-disciplinary research field of tissue engineering and artificial organ. The limited supply of donor tissues and organs has become a major medical challenge that compromises the treatment outcome of many diseases and injuries. This course will cover the key elements of tissue engineering paradigm including the therapeutic cells, biomaterial scaffold, inductive factors, and recent developments and challenges in the field of tissue engineering and artificial organs. Specific topics including stem cells, extracellular matrix, biomimetic biomaterial design, morphogens, controlled delivery, and mechanotransduction will be discussed in this course.

Advanced Materials in Biomedical Imaging and Diagnostics: Introduction, Principles and Applications

This course is aimed at covering state-of-the-art biomedical imaging and diagnostic technologies that are currently applied clinically, in clinical trials or under active preclinical development, including but not limited to optical imaging, ultrasound imaging, photoacoustic imaging, MRI, CT, nuclear imaging, point-of-care diagnostics, synthetic biomarkers, etc. It provides an introduction of different biomaterials that underpin modern biomedical imaging and diagnostic applications. Students will have a basic understanding of the principles associated with each technology and how material science was leveraged to solve healthcare challenges.

Biomaterials

This course is aimed at discussing the basic theoretical issues of biomaterials science and engineering from the perspective of physical chemistry with a focus on the structure of biomaterials and the formation of material structure. Besides, it describes the fundamentals of various materials related to biomedical engineering, including metal, inorganic non-metal and organic polymer materials, in terms of composition, structure, chemical and physical properties, and introduces thermodynamic functions and laws governing equilibrium properties, relating macsroscopic behavior to atomistic and molecular models of materials. Also, it introduces structure of crystalline and non-crystalline states, symmetry and tensor properties of materials, point, line, and surface imperfections in materials, materials phenomena such as phase transformations, multiphase equilibria, chemical reactions, mechanical property, synthesis and application of polymeric materials. Through studying of the course, students will master the basic theories of material structures, the relationship between materials structures and materials properties, materials thermodynamics and materials kinetic.

Hybrid Techniques of Emergent Soft Matter

This course is aimed at stimulating the students' interest in material and technique development based on soft matter materials. In this course, we will have three or four professors to give individual lectures. They will introduce the emergent technologies of soft matter, with polymers as the representative, involving: affordable and clean energy from polymer solar cells, energy storage technologies with polymers, gas separation and water cleaning with porous materials, and polymers supported new display technologies. Students will learn via lecture, tutorial, and group discussion. Soft matter is usually defined as materials made of mesoscopic entities, sensitive to thermal fluctuations and to weak perturbations. Archetypal examples are colloids, polymers, amphiphiles, liquid crystals, foams. The implication of soft materials in everyday commodity products, as well as in technological applications, is enormous.

Biomimics of Emergent Soft Matter

This course is aimed at introducing about developing soft materials with uses ranging from biomedical applications and advanced robotics to responsive materials and beyond. Biomimetics in soft materials is an innovative field of study where scientists and engineers draw inspiration from the natural world to design and fabricate materials that replicate the remarkable properties of biological tissues and organisms. This interdisciplinary approach leverages the principles of biology, chemistry, materials science, and engineering to create soft materials with functionalities that often surpass conventional synthetics. The exploration of biomimetics in soft materials not only holds the promise for technological breakthroughs but also offers profound insights into the symbiosis between synthetic and biological systems.

Artificial Intelligence and High-end Manufacture

Large Language Models and Prompt Engineering

This course is aimed at briefly introducing the recently popular Large Language Model (LLM), and how to teach it to work in the ways we want using Prompt Engineering. The prompt engineering is to generate a set of prompts (i.e., instructions) designed specifically for LLMs so they can perform specific tasks that they have never seen before. For instance, teach LLMs to become a poet that can produce poetry of given topics, or a writer that can come up with reports given a set of keywords. In this course, students will learn how to design effective prompts by looking into the typical properties of LLMs, with exercises provided.

Soft Robotics

This course is aimed at offering a comprehensive introduction to the exciting and rapidly developing field of soft robotics. In this course, students will delve into the design, modeling, and analysis of typical soft actuators, such as pneumatic artificial muscles, gaining a thorough understanding of their unique properties and capabilities. The course also explores the wide range of applications for soft robots in various fields including biomedicine, industrial automation, service robotics, and more. Through a combination of lectures, hands-on laboratory sessions, and project-oriented learning, students will develop the skills necessary to design and create their own soft robots including soft grippers and mobile platforms. With a focus on practical application and hands-on experience, this course is perfect for students interested in robotics, mechatronics, materials science, and related fields. By the end of the course, students will have a basic understanding of the fundamental principles and practical applications of soft robotics, positioning them well for further studies or careers in this exciting and emerging field.

Smart Factory

This course is aimed at offering a dynamic exploration of how interconnected factories, driven by the Internet of Things (IoT), artificial intelligence (AI), and data analytics, are reshaping the manufacturing landscape. The course will explore the integration of advanced robotics, the transformative power of AI and machine learning in production, and the pivotal role of big data in operational optimization. Additionally, we will delve into the innovative realms of sustainable manufacturing practices, ensuring a comprehensive understanding of how these technologies contribute to efficiency and environmental sustainability. The course also addresses crucial aspects of cybersecurity and ethical considerations in automated systems. Through a blend of theoretical knowledge and practical insights, including case studies and industry expert interactions, this course is designed to ignite students' curiosity and equip them with a deep understanding of the future of manufacturing.

3D Vision Intelligence

This course is aimed at providing lectures for students with interests in computer vision and deep learning. This course emphasizes collaboration with enterprises, and as a result, a portion of the course content will be sourced from Orbbec Technology Co., Ltd., and the OpenCV community. Throughout the program, students will gain a solid understanding of fundamental concepts in artificial intelligence and 3D vision, and learn how to apply this knowledge to solve engineering problems. Key topics covered in this course include basic concepts of artificial intelligence and 3D vision, 3D visual data representation and visualization, 3D imaging principles, 3D rendering and visualization, visual recognition based on point cloud, and synchronous localization and mapping algorithms.

Metaverse Introduction and Practice

This course is aimed at introducing about the latest development results on metaverse-related technologies. The metaverse entails the virtualization and digitization of the real world, leading to significant transformations in content production and user experiences. This course uniquely blends theory with hands-on practice, incorporating NVIDIA Omniverse-related software systems to provide a solid foundation for experimentation. Throughout the curriculum, students will delve into key areas such as 3D engines, digital twins, enabling the conversion of theoretical knowledge into practical skills. The course is designed to empower students in applying these techniques to solve real engineering problems. Major topics covered include 2AIGC and the metaverse, blockchain, human-computer interaction, 3D engines, digital twins.

Low Carbon Smart Energy

This course is aimed at offering an all-round introduction of machine learning and power systems. This course emphasizes the application of machine learning in the power market and energy field, and provides rich experiments and video cases to enhance students' participation and cultivate students' innovative thinking and problem-solving ability in the energy field. Throughout the course cycle, students will develop a solid understanding of the basic concepts of machine learning and power systems, and learn how to apply what they have learned to practical engineering problems. The main content of this course includes the basic concepts of low-carbon smart energy, the principles and technologies of energy management, the operation mechanism of electricity market and related policies, and the specific application of machine learning in the field of energy management.

Chemistry and Chemical Engineering

Frontiers of Chemical Biology

This course is aimed at providing students with a deeper understanding of the cutting-edge research hotspots in chemical biology, including but not limited to biological orthogonal synthesis chemistry, molecular imaging, etc. Chemical biology combines the scientific ideas and approaches of chemistry, biology, and allied disciplines to understand and manipulate biological systems with molecular precision. This course mainly introduces significant concepts or research progress reported in any field that intersects chemistry and biology. The teaching methods are quite diverse, including concept introduction, topic discussion, experimental verification and summary.

Molecular Magnetism

This course is aimed at giving a brief introduction of the magnetic properties of molecules, that possess unpaired electrons with net spin angular momentum. Magnetism is a generalized phenomenon in our daily life, which is originated from the electron spin. During the course the cutting-edge overview, theoretical deduction, and knowledges of molecular magnetism will be presented, and the mathematical tools as well as their applications in molecular magnetism will also be elucidated.

Metal Catalysis towards Functional Molecular Synthesis

This course is aimed at embarking on a journey through the fundamental principles, cutting-edge methodologies, and diverse applications of metal-catalyzed reactions in modern organic synthesis. Metal catalysis has revolutionized the way chemists construct complex molecules, enabling the efficient formation of intricate carbon-carbon and carbon-heteroatom bonds with remarkable selectivity and efficiency. As we delve into this course, we will unravel the underlying mechanisms, explore the synthetic potential of different transition metal complexes, and examine the pivotal role of ligand design in steering the reactivity and selectivity of metal-catalyzed transformations.

Cultural Courses

The beauty of mandarin

Greetings & Chinese Songs

Mandarin is the official language of China and is one of the six working languages of the United Nations. This class will introduce the simple application of Mandarin and traditional Chinese songs. Students can learn the Chinese "pronunciation" and traditional Chinese culture through songs.

The Window of China's economy

The Guangdong – Hong Kong – Macao Greater Bay Area

The lecture introduces the basic situation of the Guangdong – Hongkong – Macao Greater Bay Area (GBA), One of China's national strategies. Prosperous bay area economies, represented by the New York Bay Area in the US and Tokyo Bay Area in Japan, have been growing and attracting worldwide attention. Nowadays, as a rapidly rising country and the world's second-largest economy, China has been constructing three major bay areas including the GBA. Compared with other bay areas at home and abroad, the GBA enjoys its unique feature of covering two different sociopolitical systems, three independent customs territories, and three jurisdictions. Therefore, the GBA is not only economically significant but also is a grand experiment for China's political system and social governance.

Heritage for thousands of years

Chinese Kungfu

Chinese Kungfu is one of the precious cultural heritages of the Chinese nation. It has a long history and changes with the continuous evolution of Chinese traditional culture. The main task of the class is to teach students to strengthen their body through Chinese Kungfu, while learning self-defense.

Flowing art

Calligraphy

Chinese calligraphy is an important part of traditional Chinese culture. It is not only an art form, but also a way of cultural inheritance and spiritual transmission. This calligraphy class mainly introduces the development of calligraphy and calligraphy fonts, and teaches the specification of writing pens, with the explanation, demonstration and practice.

One of the Four Cuisines in China

Canton Cuisine

In China, different cities and regions have their own unique food culture. Located in the south of China, Guangdong boasts rich natural resources and unique climatic conditions, which provide advantages for the development of Guangdong cuisine. Cantonese cuisine pays attention to the freshness of ingredients and exquisite production techniques. This class is designed to allow students to understand the evolution of Cantonese cuisine and experience the process of making Cantonese food.

Field Trips

GAC AION

GAC AION (formerly known as GAC New Energy), the world's largest unicorn in the new energy vehicle industry with a valuation exceeding 100 billion, is a leading electric vehicle brand under the GAC Group, one of the Fortune Global 500 companies. The GAC AION Intelligent Ecological Factory was selected into the World Economic Forum's (WEF) "Global Lighthouse Network" in 2023, becoming the world's only NEV lighthouse factory.

Tencent

Tencent is a world-leading tech giant from Shenzhen, which innovates products and services to improve people's lives through technology. Its communication and social services reach more than 1 billion people worldwide, providing social networking, media, entertainment, fintech, and digital solutions. Its popular platforms include WeChat, QQ, well-known games "League of Legends" and "Honor of Kings", WeBank, and others.

China Mobile Guangzhou

China Mobile is the largest telecommunications operator in China and the largest mobile communication company globally, ranked 62nd on the Fortune Global 500 list.
China Mobile provides a wide range of mobile communication services, including voice, data, broadband, and more. Simultaneously, it innovates and develops in emerging technology fields such as 5G networks, the Internet of Things, big data, and cloud computing. China Mobile serves nearly 1 billion customers, and its annual revenue reached RMB 1009.3 billion.

Guangzhou Urban Planning and Exhibition Center

Guangzhou Urban Planning and Exhibition Center is a platform for a comprehensive display of city planning, natural resources, and urban culture. It has the functions of science education, interactions between the government and the people, academic exchange, planning announcements, rule of law publicity, etc. The main content of the center includes Guangzhou's overall situation, urban history, famous city planning, overall planning, transportation and municipal facilities, key development areas, urban science, urban planning.

Yongqing Fang

Yongqing Fang is located on Enning Road, the site of former Xiguan with rich cultural heritage in Guangzhou. Enning Road still retains the essence of Guangzhou Xiguan Arcade Building. This centuries-old alley full of Lingnan cultural temperament looks a little narrow from a current perspective, but it is the birthplace of Cantonese opera, and it is also a place where the rich merchants and famous families are entrenched. Bruce Lee's ancestral house, Bahe Guild Hall and Cantonese Opera Museum are all gathered in this area.

Pearl River Night Cruise

Nowadays, the Pearl River of Guangzhou has become premier tourist destination because of its breathtaking beauty. It is an absolute must-see during your journey in Guangzhou. Traditional tour: cruise from Guangzhou Bridge to Bai Pond. Exclusive one night tour: cruise from Guangzhou Bridge to Bai Pond and extends to Huang Pu Port, an overnight tour.

Guangdong Museum

Guangdong Museum mainly exhibits Guangdong's history, culture, art and nature, and is set up with a history museum, a nature museum, an art museum and a temporary exhibition hall. The shape of the museum utilizes the "treasure box" design concept, which is derived from the ivory ball, a traditional craft in Guangdong.

Chen Clan Academy

Chen Clan Academy also known as Chen Jia Ci, is the Guangdong folk craftwork museum. It was built in 1890 with the donations of members from the Chen family who lived in 72 different counties in the Guangdong province.
Covering an area of 15000 square meters, the temple has a rectangular main building and comprises six courtyards, nine main halls, and nineteen buildings. With an architectural design of traditional Guangdong style, the temple is especially renowned for its beautiful decorations. In the temple, historical figures, legends, and scenes are represented in many art forms, including wood carving, brick carving, pottery, carving, stone carving, lime carving clay sculpture, ash sculpture, brass and cast iron, grotto, new year painting, and so on. These artistic and historical attributes make the temple an important attraction in Guangzhou.
In 1959, Chen Clay Academy was used to be the folk art museum in order to collect, preserve, research and promote the folk art of Guangdong area, such as pottery, carving and embroidery. At present, it also has special show rooms for modern furniture, calligraphy and painting, Chinese writing brush ink stick, ink slab and paper, tea art etc.

Students' Sharings from 2024 GSSEE

Elashmawy Sara Ahmed Mohamed Abdelwahab
Imperial College London

I was impressed by the collaboration and team spirit at SCUT. The hands-on approach in the practical courses encouraged us to apply the theoretical knowledge we learned in class to real-world situations. Additionally, the visit to GAC AION was deeply inspiring. I firmly believe that the future of new energy vehicles is limitless, and this visit not only broadened my horizons but also strengthened my confidence in the prospects of the new energy vehicle industry.

Oxendale Claire Louise
University of Bradford

I really enjoyed the trip to China mobile, because it changed my thoughts on the scale and achievement of the enterprise. Knowing that China Mobile is establishing itself with the R&D of 5.5G, remote surgery etc. I truly admire the enterprise for its achievement. A highlight was the appearance of the robot dog, something I had only ever seen in science fiction, now brought to life. This experience was both magical and exhilarating, filling me with endless imagination and anticipation for the future of engineering.

Aranja Krishi
The University of Edinburgh

I attended the Summer School programme in Chemistry and Chemical Engineering. It provided me with an invaluable platform to interact with students from all over the world, and on top of that the lively and interactive classes allowed me to gain a wealth of chemistry knowledge in a relaxed atmosphere. In addition, we were able to immerse ourselves in Chinese language learning and taste a variety of cuisines. This was a valuable experience and I treasure this wonderful time immensely.

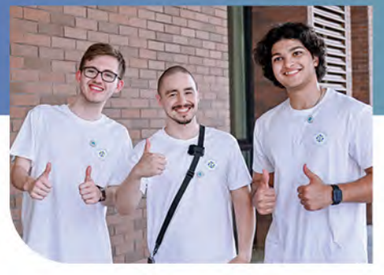
Mora Gallegos Pedro Jose
Technische Hochschule Ingolstadt

If I had to choose one word to describe my time here, it would be "futuristic". The advancements in technology I've seen at SCUT are incredible. China is truly leading the way in innovation. Seeing how the future is being created here has been eye-opening.
One moment that particularly stood out to me was our visit to Tencent and GAC AION. Walking through the halls of Tencent, one of the world's leading technology companies, was awe-inspiring as we witnessed their revolutionary projects in cutting-edge AI research and digital ecosystems. Similarly, our visit to GAC AION was equally impressive, where we observed their state-of-the-art facilities and learned about their advancements in electric vehicle technology. GAC AION's commitment to sustainable and efficient transportation solutions highlighted the potential for a greener future, making both visits profoundly inspiring.

Llaurado Crespo Blanca Mercedes
Universitat Politècnica de Catalunya · BarcelonaTech

I am truly grateful to SCUT for providing me with such an enriching experience. The institution not only expanded my knowledge but also gave me the opportunity to learn about China and form meaningful friendships with others who share my interests.

Dubasova Margarita
Moscow Aviation Institute

I really enjoyed my time at SCUT, and I'm grateful for being welcomed as a part of the summer school. Here, I had the chance of meeting friends from different countries, and I learned a lot from them. The summer school courses were both inspiring and practical, and the teachers were incredibly kind and friendly. The company visits were an extraordinary experience, and wasn't it for the summer school, I might have missed out on such a great opportunity. I would like to once again thank all the faculty members, and fellow students- your company made this trip to China a wonderful and unforgettable experience.

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