Our Mission

To provide the next generation of combustion researchers with comprehensive knowledge in the technical areas of combustion theory, combustion chemistry, and combustion-related experiments, computation, fundamentals and applications.

The 2018 Session

The 2018 session, scheduled for July 15 to July 21, 2018, will offer four courses: 1. Combustion Chemistry and Modelling; 2. Turbulent Combustion: Modelling and Applications; 3. Combustion Theory; 4. Laser Diagnostics in Turbulent Combustion Research

Intended Participants

Graduate students, postdocs and faculties in universities; combustion professionals in research organizations; R & D engineers in industries.

Program Dates

Arrival & Welcome Reception: Registration desk will be open on Sunday, July 15, 2018, from 10:00 am to 5:30 pm at Tsinghua University. This will be followed by an orientation and welcome reception in the evening at 6:00 pm.
Class Schedule: Classes will be held daily from Monday, July 16 to Friday, July 20, 2018
Conference Dinner: A farewell dinner will be held on Thursday evening, July 19, 2018
Departure: Lodging check out on Saturday, July 21, 2018

Application Materials

Applications should be made online at *www.cce.tsinghua.edu.cn/en/SummerSchool2018* before the deadline of Sunday, April 15, 2018. Admission decisions will be sent by Sunday, April 22, 2018. Admitted applicants should remit their registration fee by Sunday, May 13, 2018 to complete the registration. Late applications may be considered depending on space availability.

Location & Accommodation

The Summer School will be held at Tsinghua University, Beijing, China. On-campus dormitory lodging, as well as meal plans covering breakfast, lunch and dinner, are available to all participants. Participants may also make their own arrangements to stay and dine at nearby hotels and restaurants.

Expenses

Registration: 1,000 RMB for students and 1,500 RMB for all other participants.
Meals: Each participant will receive a Tsinghua canteen card for the use within the event period. The cost of the canteen card and the conference reception and farewell dinners is included in the registration fee.
Lodging: On-campus accommodation will be arranged by the organizing committee. A nominal cost will be paid by the participant. Please visit the summer school website for further information.

Course Descriptions

Morning Sessions (please select one of the following two courses)

Combustion Chemistry and Modelling

Lecturer: Professor Henry J. Curran, National University of Ireland, Galway, Ireland

Course Content: The course provides an introduction to the development of detailed chemical kinetic mechanisms to describe the oxidation of hydrocarbon and oxygenated hydrocarbon fuels. It includes a tutorial on the importance of thermochemistry and the use of group additivity to estimate/calculate thermodynamic parameters for species using the THERM program. There will be a detailed discussion on the important general classes of reactions associated with fuel oxidation and the calculation/estimation of the important rate constants associated with these reactions. The importance of good experimental data which are used as validation targets will also be discussed.

Turbulent Combustion: Modelling and Applications

Lecturer: Professor Epaminondas Mastorakos, University of Cambridge, UK

Course Content: Turbulent combustion sits at the intersection of chemistry and turbulence, both non-linear phenomena and both topics of extensive research. Modelling is needed in order to provide some predictive capability for this practically-important reacting flow problem. In these lectures, the usual models are reviewed, with focus on their theoretical justification and applicability to various situations showing finite-rate kinetic effects such as ignition, extinction, and pollutant formation. In addition to the theory, case studies from spark-ignition, diesel, and gas turbine engine combustion modelling are discussed extensively in order to show the strengths and limitations of each modelling approach. A brief overview of some pertinent topics from classical turbulence studies is included to enhance the student's understanding of turbulent combustion modelling.

Afternoon Sessions (please select one of the following two courses)

Combustion Theory

Lecturer: Professor Moshe Matalon, University of Illinois at Urbana-Champaign, USA

Course Content: The aim of this course is to provide students with an understanding of the theoretical foundations of combustion science, and show how the acquired knowledge help assisting experimental and simulation studies and facilitate predictions of combustion systems. The focus will be on the physical aspects of combustion, associated with the fluid mechanics and transport and that will be presented in a systematic way, starting from the general equations describing the flow of chemically-reacting mixtures. Various approximations used in combustion studies will be discussed along with their physical significance. The topics presented include: deflagration and detonation waves, the planar premixed flame and the laminar flame speed, hydrodynamic theory of premixed flames, flame stretch and differential diffusion effects, the structure of detonation waves, diffusion flames, lifted flames and edge flames, ignition and extinction phenomena, burning of condensed fuels and spray combustion, intrinsic flame instabilities, and turbulent combustion.

Laser Diagnostics in Turbulent Combustion Research

Lecturer: Professor Jeffrey A. Sutton, Ohio State University, USA

Course Content: The course provides an overview of several laser-based measurement techniques, building up from working principles to application. Velocimetry techniques, as well as scalar measurements for species concentrations and temperature will be discussed. Both particle-based and gas-phase measurements will be treated, focusing on the underlying light-matter interaction, spectroscopy, and signal interpretation. A primary area of discussion will target the challenges for quantitative measurements in turbulent combustion environments. Several high-fidelity measurement examples from laboratory-scale flames/reactors will be presented to showcase new insights to turbulent combustion physics. Finally, new and emerging laser-based approaches will be discussed which target a fully four-dimensional description of realistic combustion environments.

Note on Course Selection

The courses on Combustion Theory and on Combustion Chemistry and Modelling are the foundational combustion courses, suggested to be taken by first-timers especially first-year students. The other two are advanced, enrichment courses.

Poster Session

Applicants are encouraged to submit abstracts for the poster session, with recently published or accepted papers by the presenter related to the work. Exhibition space is limited and decision on acceptance will be made by the organizing committee.

Further Inquiries

Direct inquiries on the academic program or the logistics of participation to either the program administrator, Ms. Hong Tian, (86)10-62796768, ccess@tsinghua.edu.cn, or the program co-organizer, Prof. Yu-Cheng Liu, ycliu7@mail.tsinghua.edu.cn