Guidelines for UKSP/MIST Summer School Organisers

This document details recommendations on the STFC Introductory Course in Solar and Solar-Terrestrial Physics from MIST and UKSP Councils. Organisers are recommended to consult MIST and UKSP Councils at an early stage in preparation.

Full details on the STFC application can be found here: Funding support for short courses and summer schools – UKRI. The UKRI website includes detailed advice on how to plan and bid for the summer schools. The deadline is typically 1 October.

Core Content

We request that the schedule includes the core lectures, with the remainder of the sessions open for the organisers to fill. We hope this flexibility allows organisers to include topical sessions, sessions that are unique to their institution, and sessions that cover wider topics such as public engagement.

Below are the suggested core lectures for each of the schools. Each lecture is suggested as 1 hour which includes time for discussion or Q&A.

Fundamental, **UKSP-focused**, **MIST-focused**, **UKSP and MIST**

1. **Introduction to Plasma Physics**: gyration, drifts, plasma oscillations, EM waves in magnetised plasmas, elements of plasma kinetics.
2. **Introduction to MHD**: MHD equations, applicability conditions, MHD equilibria, basic timescales, and dimensionless parameters.
3. **MHD Waves and Instabilities**: Waves in uniform media, modes of a magnetic flux tube, basic macroscopic and microscopic instabilities.
4. **Magnetic Reconnection**: 2D reconnection (Petschek + Sweet-Parker), basic concepts of topology, diffusion regions and observational investigation.
5. **Solar Interior and Helioseismology**: Dynamo theory, differential rotation, global and local helioseismology, and its results.
6. **Introduction to the Solar Atmosphere (physics and phenomena)**: photosphere, chromosphere, TR, corona, coronal heating, flares.
7. **CMEs, the Solar Wind and the Heliosphere**: Basic solar wind models, basic structures, phenomenology of CMEs, MHD turbulence, heliopause.
8. **The Magnetosphere**: basic topology, bow shock and magnetopause, magnetotail, plasmasphere, radiation belts, ring current, current systems, substorms and geomagnetic activity.

9. **The Ionosphere, Thermosphere, and Mesosphere**: formation and structure, ion-neutral coupling, vertical coupling, dynamics, energy dissipation, chemistry, auroral acceleration, conductivities, and currents

10. **Planetary Plasma Environments**: planetary ionospheres, planetary magnetospheres, solar wind interaction with magnetised and (near-)unmagnetised bodies, M-I-T coupling, plasma boundary formation, planetary conductivities, plasma transport, Dungey and Vasyliunas cycles, planetary space weather.

11. **Impacts of Space Weather:** solar irradiance effects, UV variability, effects of flare radiation, CMEs and SEPs, changes in the upper atmosphere, infrastructure and technology impacts, aviation, space flight and human impacts.

12. **EDI and Mental Health During Your PhD**

Additional Sessions

In addition to the core content above, each School will have slots to be decided by the host for extra topics. We note that although most of the core sessions may be traditional lecture format, the organisers should feel welcome to use different formats for the additional sessions (e.g. workshops, panel discussions, student presentations etc.).

We include below some previous sessions that received good student feedback, although organisers should feel free to try new session ideas too.

- Career session, including a diverse range of career options/paths
- Networking sessions
- “Ask me anything”
- Space Weather Disaster scenario
- Public engagement and outreach

Organisers often schedule evening activities for the students. We highlight that these activities are highly valued by the students, and that networking and building peer connections are a key part of the summer school. The activities should prioritise inclusivity and be accessible for all students.

Selection of Lecturers

The primary requirement is of course that lecturers should be experts in the relevant field, who can present clear and interesting talks. Organisers should pay attention to balancing seniority and institutions of speakers. In particular, **organisers must schedule a diverse range of speakers, including those from underrepresented demographics**. The STFC guidelines note to “be mindful that speakers from underrepresented groups may be overcommitted and more likely to decline, so should be approached first for the highest chance of achieving a

balanced final program". Statistics for speakers and participants should be kept and included in the final report.

STFC highlights that Ernest Rutherford Fellows and UKRI Future Leader Fellows are expected to participate as lecturers (full details included on the STFC guidelines). MIST and UKSP Councils will be able to advise on eligible members of the community.

In the interests of efficiency of lecture preparation, it may be helpful to "recycle" some (but not all) lecturers from previous schools to speak on the same topic. We also hope that all lecturers would be prepared to share their materials with successors.

Student feedback

Organisers should collect feedback from students. STFC provides an online survey that can be used if desired. Feedback should be included in the final report to STFC and circulated to UKSP and MIST Councils.

Locations and Organisers

For your information, the list of the locations and organisers for 2023 - 2029 is below. A historical list of previous hosts can be found on the UKSP website.

Year	Institution	Lead Organiser(s)
2023	St Andrews	Elsden & Neukirch
2024	Sheffield	Erdelyi
2025	Birmingham	Allanson
2026	Southampton	Gingell
2027	Aberystwyth	Morgan
2028	Leicester	Yeoman
2029	Northumbria	Rae