Aalto University
School of Electrical
Engineering

Space Climate ELEC-E4540, NP00AF44
21.4 – 27.5.2022

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Lecturers prof. Eija Tanskanen
Prof. Kalevi Mursula, Prof. Ilya Usoskin, Prof. Pekka Verronen, Prof. Timo Asikainen,
Shabnam Nikbakhsh, Marzieh Khansari, Reko Hynönen

Lectures: Thu 10:15 – 12:00 and Fri 10:15 – 12:00

Teaching assistants:
Shabnam Nikbakhsh, Reko Hynönen, Marzieh Khansari

Administration at Oulu: Marzieh
Administration at Aalto: Shabnam

email: name.surname@oulu.fi and name.surname@aalto.fi

Lectures will be given virtually https://oulu.zoom.us/j/66652930373

Space Climate: content

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- Long-term evolution of the Sun and basics of the Sun – Earth coupling
- Basics of the solar wind, interplanetary magnetic field, galactic cosmic rays
- Sunspots and coronal holes, grand solar maxima and minima
- Seasonal and decadal changes of geomagnetic activity
- Geomagnetic observations
- Real-time space weather analysis
- Hands-on-data exercises and scientific writing

GOALS:

To be aware of the basics of space climate, and to understands how the solar activity changes over the decades and centuries.

To understands how the Sun affect to the near-Earth space and infrastructure.

Be able to read scientific literature and write short summaries on their results.

Be able to handle time series data with basic analysis tools, and to do the basic space weather measurements.

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Previous knowledge & work load

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Previous knowledge

Good knowledge on physics and mathematics, and motivation to learn space climate related science and scientific writing.

Work load

Lectures 10 x 2 x 45 minutes
Homeworks 5 (on scientific paper, oral presentation and quiz)
Independent work 50 hours
(reading 1 book chapter and 1 science paper & writing 2 page summaries)
Oral exam 30 minutes for each

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Schedule and topics

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Thu 21.4	Basics of the Sun-Earth coupling, Prof. Eija Tanskanen
Fri 22.4	Scientific writing, Eija & MSc. Marzieh Khansari, HW1, oral talk topics
Thu 28.4	Space climate terminology, MSc. Shabnam Nikbakhsh, HW2, quiz 1
Fri 29.4	Sunspots and solar active regions, Shabnam Nikbakhsh
Thu 5.5	Coronal holes, solar wind and IMF, Prof. Kalevi Mursula, HW3, scientific article
Fri 6.5	Galactic cosmic rays, Prof. Ilya Usoskin
Thu 12.5	Climate effects, Prof. Timo Asikainen, HW4 oral slides
Fri 13.5	Space weather effecst and oral preparation, MSc. Reko Hynönen, Eija Tanskanen
Thu 19.5	Middle atmosphere and solar particles, Prof. Pekka Verronen, HW5 quiz 2
Fri 20.5	Oral talks, students
Fri 27.5	Oral exam, 30 minutes for each student (additional exam day 31.5)

Zoom link to the lecture: https://oulu.zoom.us/j/66652930373

A voluntary homework discussion will be organized each Thursday at 12:00 – 13:00.

Grading

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- Lectures 0,5 point per lecture	5
- Home works (*) 5 points each	25
- Presentation slides	10
- Oral exam	40
Total points	**80**

Grade 5/5 with 73-80 points
Grade 4/5, 65-73 p
Grade 3/5, 57-65 p
Grade 2/5, 49-57 p
Grade 1/5, 41 – 49 p

* Home works 1-5: oral topic, quiz1, paper, oral slides, quiz2

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Topic of today:

Planetary health

Thursday 21 April 2022 virtually via Zoom