

# The science of Sound and Music elective package

| The science of Sound and Music   |  |
|----------------------------------|--|
| <b>Offered by</b>                | Department of Built Environment, Mechanical Engineering, Industrial Design, Industrial Engineering and Innovation Sciences   |
| <b>Language</b>                  | English  |
| <b>Primarily interesting for</b> | All students, but most relevant for students with background in This package is recommended for students from all Bachelor majors, in particular for students who plan to continue with a Master's program related to one of the organizing departments. |
| <b>Prerequisites</b>             | Required courses: -<br>Recommended courses: -  |
| <b>Contact person</b>            | dr.ir. Maarten Hornikx (m.c.j.hornikx@tue.nl)  |

## Content and composition

Sounds are a product of all human activities and are all around us. Sounds can be pleasant and useful but they can also be a serious threat to our health. Understanding how to deal with sound is crucial for the future sustainability of our living environment and almost all TU/e graduates will sooner or later be faced with it. For example, the positive effects of sound can be optimized in the design of concert halls, but sound could also arise from adverse effects of technological innovations as wind turbines. To preserve a high acoustic quality of our (technological) environment, The 'Science of Sound and Music' (SoS) offers a unique series of coherent courses. SoS is offered by a team of university-wide teachers, and will enrich the TU/e Bachelor program with a vast content on acoustics, open for students from all departments. Sound is of utmost importance in music, and this will be used as analogy for acoustic applications in technology. The SoS courses will illustrate the acoustic horizon with its (im)possibilities, and skills in dealing with acoustic engineering problems will be trained. It offers the excellent preparation to a Master's program at one of the participating departments.

| Course code | Course name          | Level classification |
|-------------|----------------------|----------------------|
| 7S5X0       | Acoustic Awareness   | 1.                   |
| 7S6X0       | The Science of Sound | 2.                   |
| 7SAX0       | Sounds good!         | 3.                   |

The courses within the package are arranged in a sequential order: students are supposed to have finalized 7S5X0 when starting 7S6X0 and are supposed to have finalized both 7S5X0 and 7S6X0 when starting 7SAX0.

## Course description

### Acoustic Awareness (7S5X0)

A wide range of appealing acoustical principles, phenomena and applications from daily life are presented in a popular scientific way, partly by examples and demonstrations. Analogies of sound with applications in music are made. Students carry out a literature study in small groups on a self-proposed acoustic subject and present their work by means of a small paper and a presentation. In the second part of the course, the student groups prepare answers to an acoustic question, which are (partly by experiments) plenary presented in a form of a popular science quiz.



# The science of Sound and Music elective package

## **The Science of Sound (7S6X0)**

The content of this course relies for a large part on the book 'The Science of Sound', in which the fundamentals of acoustics are treated such as the principles of sources of sound, sound transmission and sound perception. Book chapters are moreover dedicated to applied acoustic fields as room acoustics and electro acoustics. The course topics are related to the source-transmissionreceiver analogy, as well to music(al instruments). The topics alter weekly and cover vibrations, waves and sounds; the mathematics of sound; sound perception; acoustic communication; sound design; vibroacoustics and musical instruments; room and electro-acoustics, and environmental acoustics. The state-of-art of scientific research related to the treated subjects are illustrated, as well as the current research topics at the various TU/e departments. The course has an interactive character and will contain short quizzes.

## **Sounds good! (7SAX0)**

Project descriptions from industry companies emphasize the technology-wide presence of acoustics. Engineers from various fields illustrate the role of acoustics in their work, as well as the acoustical knowledge and skills needed to tackle problems they are faced with. Teams will be constituted with students from various TU/e departments. The teams will be assigned a project of their interest and will carry out most of the project in cooperation with the industry company. Besides, all groups will get a coach from TU/e. The results of the project-work will be presented at two instances. Halfway the project, a progress presentation is made at the industry company. Finally, all projects are presented at the TU/e Sound Symposium, which will be public for everyone with an interest acoustics.