

# Course PM for Electroacoustics, VTA141, 06-Aug-2023

## Course Purpose

The purpose of this course is to give the students insight into the challenging and expanding field of audio. Of primary interest are the properties of electroacoustical transducers. Examples of such are microphones based on different conversion principles with various directional characteristics. Another important example is the electrodynamic driver and we will study how the low and high frequency responses are affected by the design of the loudspeaker enclosure.

We will introduce acoustical, mechanical, and electronic analogies, which constitute a powerful tool for linking the different domains. We'll also look into stereo and surround sound reproduction and the psychoacoustics related to it. The course wraps up with an introduction to loudspeaker and microphone arrays.

## Personnel

Examiner/lecturer: Jens Ahrens, phone: 031 772-2210, e-mail: [jens.ahrens@chalmers.se](mailto:jens.ahrens@chalmers.se)

Course assistant: Hannes Helmholtz, e-mail: [hannes.helmholtz@chalmers.se](mailto:hannes.helmholtz@chalmers.se)

## Course Literature

Course materials will be available for download from the division's website at <http://www.ta.chalmers.se/education/course-materials/electroacoustics/> as the course progresses. Contact the instructors to obtain the password.

## Scheduling

Lectures, in-class exercises and 1 lab according to the schedule below. The lab is planned for v49. Find the detailed scheduling here: <http://www.ta.chalmers.se/education/schedules/>. All activities take place at the lecture hall at Applied Acoustics, Sven Hultins gata 8A.

### **Week 1 (v35)**

L1 Electric Circuits

### **Week 2**

L2 Electric Circuits

### **Week 3**

L3 Radiation

E1 Electric Circuits

### **Week 4**

L4 Radiation

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E2 Electric Circuits

### **Week 5**

L5 Radiation

E3 Analogies

### **Week 6**

L6 Loudspeakers

E4 Analogies

### **Week 7**

L7 Loudspeakers

E5 Radiation

### **Week 8**

L8 Loudspeakers

E6 Radiation

### **Week 9**

*Pause* (exam week)

### **Week 10**

Lab (in groups, scheduling *tbd*, report submission 14 days later)

### **Week 11**

L9 Loudspeakers

E8 Radiation

### **Week 12**

L10 Microphones

E9 Loudspeakers

### **Week 13**

L11 Microphones

E10 Loudspeakers

### **Week 14**

L12 Stereophony

E11 Microphones

### **Week 15**

L13 Stereophony

E12 Microphones

### **Week 16**

L17 Misc

## Summary of Modifications Since Previous Lecture Season

n.a.

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### Examination

The exam is in written form. A typical exam consists of 1–2 essay tasks and 4–5 problems (6 in total). Correct answers/solutions are awarded 5 points. The following aids are allowed: Mathematical tables, electronic calculators without text memory and the custom list of equations for the course as available from the course website (without self-written notes). A minimum of 12 points is required for a passing grade as well as approved completion of the laboratory project.

The laboratory will take place in v49. The approval of the project is performed based on active participation in the work and on the report on the work. The report needs to be submitted by email at the latest 14 days after the measurements that the laboratory comprises have been done. The laboratory project is mandatory. If a student is not able to participate in the laboratory project, she/he has to inform the lecturer immediately to arrange an equivalent alternative assignment.

The exam will take place on January 10, 2024 in the afternoon. Location *tba*.