Audio Arts and Acoustics (AAA) Assessment Report 2022-23 AY

Courses: Audio Theory and Systems (AUDI 103); Psychoacoustics (AUDI 231)

Summary

In the 2022-23 Academic Year, the department examined student performance on final exams in both Audio Theory and Systems (AUDI 103); Psychoacoustics (AUDI 231). Item analysis was performed on these exams, giving the department to look at student scores on individual test items and the broader categories of questions, which relate to course and program learning outcomes.

Audio Theory and Systems

The department examined performance on the XX question Final Exam in the Spring 22 semester.

Question Title	N	% Correct
A 4,Ñ¶ loudspeaker draws more current from the amp than an 8,Ñ¶ loudspeaker.	5	80.0%
	5	80.0%
Can the above connector carry a balanced mono signal?		
	5	80.0%
Can the above connector carry a balanced stereo signal?		
	4	100.0%
Which type of connector is shown in the above image?		
A dynamic microphone requires phantom power.	5	100.0%
A loudspeaker is an electroacoustic transducer.	3	100.0%
A microphone cable is an electroacoustic transducer.	2	50.0%
A mixer is an electroacoustic transducer.	9	77.8%
A moving-coil microphone is one type of dynamic microphone.	7	100.0%
A piezo microphone requires phantom power.	5	100.0%
A power amp is rated as "200W per channel into 8,Ñ¶".	3	100.0%
How much current does an 8,Ñ¶ speaker draw from this amp?		

A ribbon microphone requires phantom power.	3	100.0%
Condenser microphones operate on the electrostatic principle.	6	100.0%
Directional microphones are always subject to the proximity effect.	19	84.2%
Dynamic microphones make use of the principle of electromagnetic induction.	4	100.0%
If you use a raw-frame loudspeaker without a baffle of any kind, you will experience a loss of high frequencies.	7	85.7%
Most condenser microphones have a lower moving mass than most dynamic microphones.	4	50.0%
Pure pressure gradient microphones are never subject to the proximity effect.	19	73.7%
The frequency response of a microphone is controlled primarily by the mass and stiffness of the diaphragm.	10	100.0%
The human auditory system is a transducer.	5	100.0%
Which type of connector is shown in the above image?	3	100.0%
Aliasing becomes audible as inharmonic distortion.	1	100.0%
Dither is deliberately added to a digital audio signal to trade off distortion for noise.	3	100.0%
Jitter is instability in clock speed during sampling.	5	100.0%
What type of filter does this circuit diagram show?	6	100.0%
A band-limited analog signal can be sampled without loss.	2	50.0%
A compressor with a ratio below 10:1 can be considered a limiter.	2	100.0%
A gate is the extreme version of an expander.	4	75.0%
A higher compressor ratio will result in larger amounts of overall compression.	7	85.7%
A higher compressor threshold will result in larger amounts of overall compression.	3	66.7%
Aliasing becomes audible as inharmonic distortion.	5	60.0%
Aliasing is caused by sample rates that exceed twice the maximum frequency in a signal.	3	66.7%
Decreasing the bit depth too much will result in aliasing.	3	66.7%
Dither is deliberately added to a digital audio signal to trade off distortion for noise.	2	50.0%
Faster compressor attack means:	1	100.0%

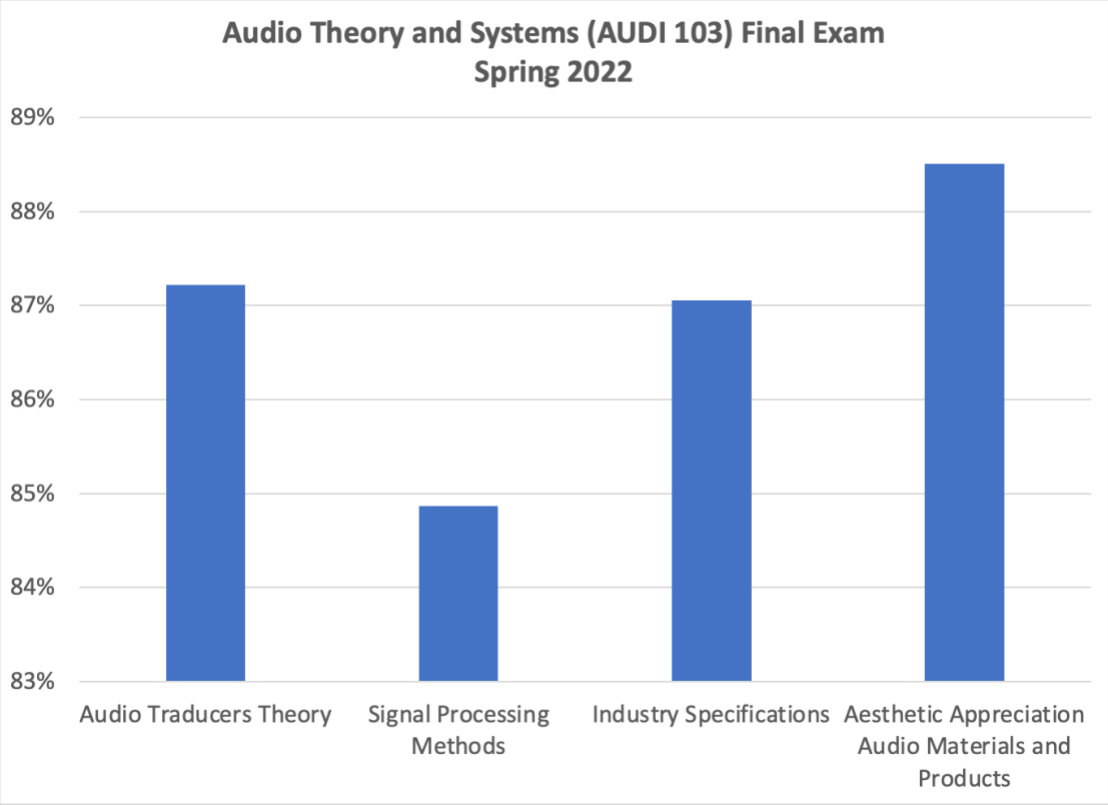
Jitter is instability in clock speed during sampling.	5	100.0%
On analog mixers, inserts are typically used for loop-in effects such as compression or distortion.	19	89.5%
Playing back a signal that has been sampled with jitter results in distortion.	2	50.0%
The output signal of a compressor will always be affected by the compressor's make-up gain, regardless of whether the input signal crosses the threshold or not.	2	100.0%
The process of sampling creates copies of the original spectrum that repeat periodically around multiples of the sample rate.	4	50.0%
The reconstruction filter in a DAC is a high-pass filter that cuts off all sidebands below the Nyquist frequency.	2	50.0%
The term dither describes irregularities of the sample clock.	3	100.0%
What type of filter does this circuit diagram show?	5	80.0%
What type of filter does this circuit diagram show?	19	89.5%
Which form of data compression does a .flac file using the FLAC coding format employ?	9	77.8%
Which form of data compression does a .opus file using the Opus coding format employ?	8	100.0%
Which form of data compression does a .wav file with PCM-encoded audio data employ?	4	100.0%
Which form of data compression does an .caf file with PCM-encoded audio data employ?	5	80.0%
Which form of data compression does an .m4a file using the AAC coding format employ?	7	85.7%
Which form of data compression does an .mp3 file using the MPEG layer III coding format employ?	5	100.0%
With a bit depth of N = 7, one can express 128 different amplitude values.	6	83.3%
4,Ñ¶, 8,Ñ¶, and 16,Ñ¶ are typical values for the rated nominal impedance of a loudspeaker.	3	100.0%
A bit depth of 20 gives you a dynamic range of roughly 120 dB.	6	100.0%
A loudspeaker's impedance rating is typically consistent throughout the frequency range.	6	100.0%
A loudspeakers's polar pattern typically becomes less directional for higher frequencies.	3	100.0%
A microphone's dynamic range refers to the difference between the highest and lowest frequency it can safely handle.	9	77.8%
A surface absorption coefficient, Œ±, of 0.0 is referred to as the equivalent of an open window in acoustics.	5	80.0%

A surface absorption coefficient, Œ±, of 0.0 means all the sound falling on that surface is reflected back into the room.	3	100.0%
T60 is measured in a given room as the time difference between the moment of arrival of the direct sound, and the moment of arrival of its first reflection.	3	66.7%
The reverberation time, T60 , is the time it takes the residual sound-pressure level in a room to drop by 60 dB.	3	100.0%
The reverberation time, T60, can vary with frequency.	5	100.0%
The surface absorption coefficient, Œ±, is always a constant with regards to frequency.	1	100.0%
What is 0.0024 U, in engineering notation?	2	100.0%
What is 0.024 U, in engineering notation?	3	66.7%
What is 0.0829 U, in engineering notation?	5	100.0%
What is 0.829 U, in engineering notation?	4	75.0%
What is 1.776 kU, in regular decimal notation?	3	100.0%
What is 1.776 MU, in regular decimal notation?	6	83.3%
What is 250 mU, in regular decimal notation?	1	100.0%
What is 250 ŒºU, in regular decimal notation?	3	100.0%
What is 34,567.9 U, in engineering notation?	2	50.0%
What is 345,679 U, in engineering notation?	3	33.3%
What is 6.03 mU, in regular decimal notation?	3	66.7%
What is 60.3 mU, in regular decimal notation?	3	100.0%
	10	100.0%
Which of the following visualizations of sound is the above image an example of?		
	4	50.0%
Which of the following visualizations of sound is the upper part of the above image an example of?		
A loudspeaker with an efficiency of 1% will convert 99% of the electrical energy coming into it to heat.	6	100.0%
A room's critical distance will (everything else being equal) increase if its T60 time increases.	3	100.0%
A room,Äôs reverberation time, T60, is proportional to its volume.	1	100.0%
Dynamic loudspeakers tend to exhibit distortion at the second and third harmonic.	8	75.0%
One characteristic of the reverberant field is that its sound level varies randomly across the room.	5	80.0%
The critical distance is the distance from a sound source in a room at which direct and reverberant sound levels are exactly equal.	5	80.0%

The high-frequency response of dynamic microphones tends to be superior to that of condenser microphones.	4	100.0%
The time interval between the arrival of the direct sound and the first major reflection has little or no influence on the auditory perception of a given space's size.	4	100.0%
When using auxiliary sends to feed on-stage monitor loudspeakers, they are usually set to post-fader.	19	89.5%
Which of the following visualizations of sound is the above image an example of?	8	100.0%
Which of the following visualizations of sound is the upper part of the above image an example of?	5	60.0%
Which of the following visualizations of sound is the upper part of the above image an example of?	5	100.0%

In terms performance per category, the results were:

Category	**% Correct**
Audio Traducers Theory	87.2%
Signal Processing Methods	84.9%
Industry Specifications	87.1%
Aesthetic Appreciation Audio Materials and Products	88.5%



The results suggest…

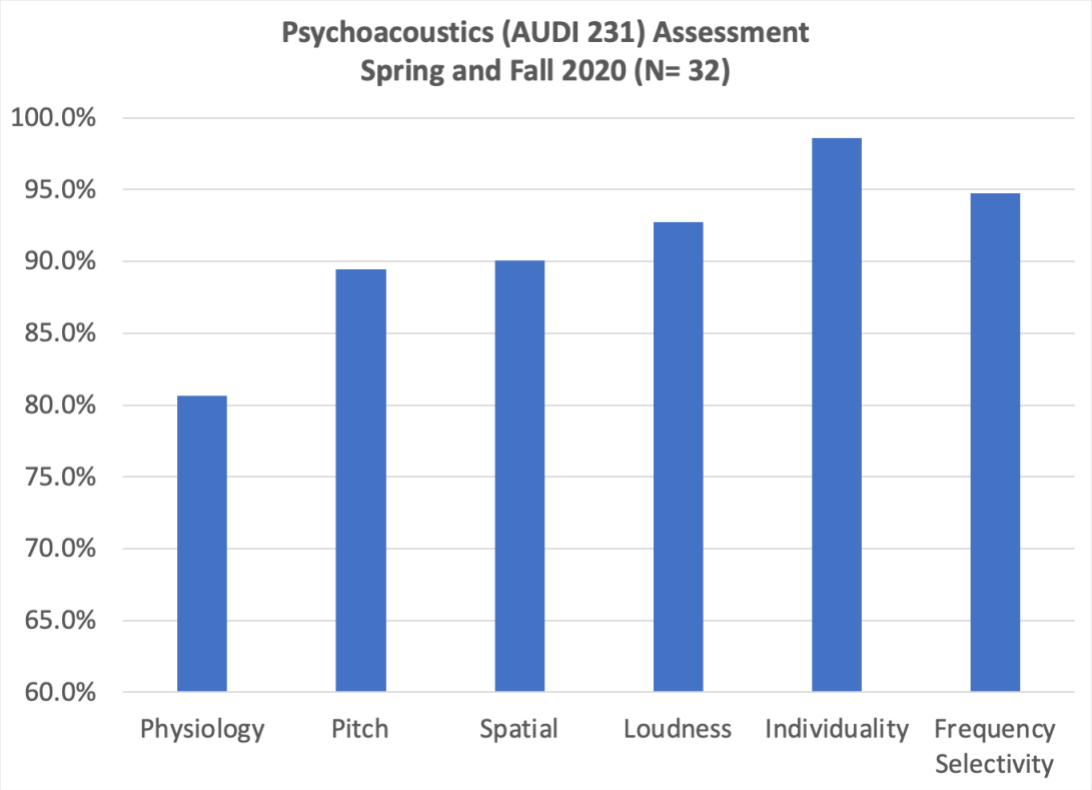
Psychoacoustics

The department examined performance on the 16 question Final Exam in the over two semesters – Spring 2020 and Fall 2020. (Because the 16th question covered multiple categories, it was not included in the anyalysis.)

Question	Category	% Correct
Q. 1: Why does the ear exhibit increased sensitivity at around 1kHz to 6kHz (i.e. how does the ear accomplish this and what value is it for human perception)?	Physiology	80.6%
Q.2 When multiple notes are played together, we have a chord. A chord can be either consonant (harmonious) or dissonant (inharmonious). What quantity makes a chord consonant or dissonant? (You may use examples to explain it.) Does different temperaments play a role in the harmonicity of the chords?	Pitch	81.3%
Q.3 What is temperament? How does it make a difference in music performance? Compare the three major temperaments introduced in class?	Pitch	97.7%

Q. 4 For two sound sources in front and back, what are the ILDs and ITDs?	Spatial	92.2%
Q. 5 Playing the same source in front and back, do they sound the same to an average listener	Spatial	75.0%
Q.6 Why can a listener turn his/her head to resolve the ambiguity in discriminating front and back sources?	Spatial	87.5%
Q. 7 Using the equal loudness contours graph, show as follows,	Loudness	92.7%
Q.8 Describe ILD and its role in sound source localization.	Spatial	98.8%
Q.9 Describe ITD and its role in sound source localization.	Spatial	96.9%
Q.10 Describe HRTF and its role in sound source localization.	Individuality	99.4%
Q.11 When listening to a classical opera, do you prefer headphones or loudspeakers?	Individuality	100.0%
Q.12 Explain in detail the “precedence effect”	Spatial	96.1%
Q.13 You are hired to create a new sound file format capable of reducing file size while maintaining sound quality.	Frequency Selectivity	93.8%
Q.14 What is masking effect?	Frequency Selectivity	95.7%
Q.15 individuality (the difference among different listeners) in spatial hearing.	Individuality	96.4%

Category	**N**	**Mean**
Physiology	1	80.6%
Pitch	2	89.5%
Spatial	6	90.1%
Loudness	1	92.7%
Individuality	3	98.6%
Frequency Selectivity	2	94.7%



Note: We still need Audio faculty to comment on this draft.