

University of Alberta Department of Music
Student Technology Recommendations for Online Lessons, Fall 2020

Hello, students! We hope you have had a good summer despite the challenging times we live in. This letter comes to you from a committee of Department of Music instructors and staff that has been working this summer to collect and review various technology options for the different kinds of courses you will be taking in the coming academic year.

We have already sent your instructors our recommendations and reviews of various software and hardware solutions that will help them give you the best experience possible for classes, lessons, or rehearsals. This document will give you an idea of what you will need for online lessons. On this page we summarize your software needs; hardware recommendations start on p. 2.

Software: Zoom, Cleanfeed, & WeVu

We have recommended to instructors that they use a combination of Zoom and Cleanfeed for teaching online lessons. Zoom provides the video, but Cleanfeed is necessary for clear, undistorted reproduction of the sounds you produce with your instrument or singing voice.

1. **Zoom:** If you haven't used Zoom before, you can sign up for a free account here: <https://zoom.us>. If you are new to U of A, many of your courses will require Zoom so be sure to sign up for an account before the term starts.
2. **Cleanfeed:** You can download Cleanfeed for free at <https://cleanfeed.net/>. You will need the Chrome browser to use this program, so if you don't already have it then you can download it here: https://www.google.ca/intl/en_ca/chrome/.
3. **WeVu:** Some instructors and ensemble directors may also require you to sign up for a program called **WeVu**. You can read about how WeVu is useful for music instruction here, but **don't sign up until your instructor or director has provided you with their course code.** <https://wevu.video/wevu-music-cases/>

Hardware: Computers, Microphones, Speakers, Headphones, Cameras, Keyboards

Below, we provide recommendations on hardware that you may need to purchase for best results in your lessons. However, you may already have equipment that will work perfectly well, so if whatever equipment you already own isn't listed below, don't feel you have to rush out and spend money on something new. You may want to try out what you have first, and then if it doesn't work as well as you and your teacher would like, you can order whatever upgraded equipment you can afford.

1. **Desktop/Laptop Computers:** The software we have listed above works best when you are using a laptop or desktop computer. If you already have a laptop or desktop you can use, great. If you don't have one and can't afford to buy one right now, don't worry--it will still be possible to have online lessons but the sound quality may not be perfect.
2. **Microphones:** Although it's possible for your instructors to hear you sing or play your instrument over Zoom and Cleanfeed using the built-in mics of a computer, the quality of the sound will be substantially better if you can use an external microphone during lessons. Most USB mics will offer an improvement in sound. They are relatively inexpensive, convenient and usually simple to set up since they plug directly into the computing device.

We provide a table of suggestions for mics in Appendix 1 (p. 10). You do not need to purchase an expensive, studio-grade mic; in fact, if you will be playing or singing in a small room during online lessons, professional-level mics may be too sensitive.

3. **Speakers & Headphones:** For listening, the best solution might be to have both headphones and speakers, for adaptability in different situations. Many students already have headphones or earbuds that will work perfectly well. Most laptops or computer monitors have built-in speakers but some of these can be inadequate in terms of sound quality.

For applied instrument lessons, you will likely need headphones of some type. Audio clarity will be much better when using headphones with web-based communication applications such as Zoom and Skype. If Cleanfeed is used, headphones are required. You can find specific suggestions in Appendix 2 (p. 11).

Speakers are a nice alternative for meetings or classes, providing a comfort break from wearing headphones. Speakers can be adequate in some lesson situations, and do allow you to sing or play without having to manage headphones. External speakers designed for computers (as opposed to speakers built into laptops or computer monitor screens) are often inexpensive and generally adequate in sound quality and volume capability.

See **FAQs and Tips** below for more information about microphones, headphones and speakers. Your instructors may provide more information specific to certain courses.

4. **Cameras:** Most recent model laptops, and certainly smartphones, will include an integrated camera that can be used for meetings, lessons, etc. If you are using a desktop computer, a camera might not be included. There are many options for external USB cameras. See our suggestions in Appendix 3 (p. 12).
5. **Keyboards:** If you do not have a keyboard at home and you are taking Music 151, 251, or 129 this year, you will need some kind of keyboard instrument on which to practice and perform your lessons and tests with your instructor. Your instructor will be able to tell you specifics such as whether you need a full, 88-key instrument or something smaller will do, whether it matters if you have an acoustic or digital keyboard, whether your instrument should have weighted action (which allows students to play with dynamic variation), or whether your keyboard needs to be MIDI-compatible. You can find a table of options at a range of prices in Appendix 4 (p. 13).

You may be able to find lower prices on Amazon, Costco, or various internet sites. However, demand may be high so be sure to check availability before you order, and if you do opt to order keyboards online, remember to also consider the costs of GST, shipping, and any cross-border duties if you're ordering from outside Canada.

Other Considerations

Regardless of what equipment you use, here are some basic points to keep in mind:

- As you have no doubt learned through experience, the speed and reliability of your WIFI network will directly affect your online education experience. If possible, using a hard-wired ethernet cable connection to your home internet router can make a big difference.
- Consider arranging for a test recording/Zoom session with a friend, family member, or technician to work out the bugs in advance of precious lesson times. Things to consider:
 - If you aren't satisfied with the sound or image quality, try adjusting your microphone/camera position. Also consider your position in relation to windows or lighting (for example, if you are in front of a window you won't be seen clearly).
 - Test your dynamic range. That is, when you play or sing at your softest dynamic level, can the person on the other end hear you? When you play at your loudest volume, is the sound distorted? Remember to test how your

speaking voice is heard on the other end as well. If the sound is distorted, try adjusting the placement or settings on your mic.

- **IMPORTANT!** When considering any equipment purchase, remember to carefully check the compatibility between devices to make sure they will work with your operating system.

FAQs and Tips

Can I just use the built-in microphone and speaker of my computer/tablet/smartphone for applied instrument lessons?

Yes, technically it is possible, but it will likely not be ideal. There are subtle aspects of the sounds produced by you or your instructor that might be harder to discern clearly if using relatively low quality built-in microphones and speakers. Making improvements to monitoring (headphones vs. speakers) first, as well as the microphone, will likely significantly improve the teaching and learning experience.

Note: The choice of software platforms and their settings are also factors affecting sound quality.

Do I really need to buy equipment? If so, how can I be sure that I make the right purchase?

The whole purpose of this document is to bring awareness of methods and possible equipment to optimize the online teaching and learning challenges of music instruction. Equipment purchases are a part of *possible* solutions.

It is difficult to predict whether or not devices with certain features will be a good fit for your particular needs.

Local vendors, such as Long & McQuade, Memory Express, London Drugs, Best Buy, who all have good return policies are a better approach than buying via Amazon and similar online vendors. Long & McQuade, in particular, is a highly recommended vendor as the staff are usually very knowledgeable about equipment for musicians.

The reality for Fall term 2020 will be that many items will be on backorder. In some cases, making do with what one has on hand may be the only choice. *Wait! What was that?* **Note:** Many students already own Zoom Handy Recorders or similar devices. Many of these can be configured as decent quality USB microphones and/or cameras - see below.

Spending more does not necessarily equate to better sound or utility. If you're thinking that a better microphone or camera or other device is a worthwhile pursuit, we recommend doing research beyond what is presented here. If a purchase is made, ensure that you test it out thoroughly. Preserve the original packaging, as you might need to return it.

What's the best position for my microphone?

Generally, for conversation, your voice will be clearer if you are 10-20 cm from the microphone. Depending upon your instrument, you can increase this distance to about a meter in a typical small room, or slightly more if the ergonomics of playing are a factor. Greater distances are employed in recording situations in order to capture the characteristics of acoustics and how the instruments blend in the room; this approach *doesn't* apply to a single instrument in a small room, picked up for the purpose of internet communications. The type of microphone is also a factor, but the basic principles are the same: proper microphone proximity and proper input level.

If your distance to the microphone with your instrument is within 1 meter, it will be easier to "lean in" for conversation.

If you are using video as well, consider your camera and microphone positions in relation to where you typically will be positioned for best audio pickup.

Thorough testing before the first lesson is essential.

How do I adjust my microphone input level?

First, determine the range of physical proximity to your microphone. See above for mic positioning.

Second, adjust the input level of your microphone so that it does not overload when you speak or play your instrument loudly within your determined physical zone. If there is a physical input level control, such as on a USB microphone, adjust this first (with computer

input level at maximum). Further adjustment if necessary can be made in the audio settings of your computer, or within your communications software (Zoom communications, etc.)

Test your input level with a friend over the internet. Alternatively, test the range of your instrument and/or voice by making a brief recording using Audacity or other recording software. Be aware that computer speakers or earbuds can distort easily. Listen back at a low level. Digital overload is obvious--if you hear a buzzy or raspy characteristic during the loud moments, try reducing your microphone input level and test again.

My input level is set correctly, but the sound quality during applied instrument lessons over Zoom is poor/distorted/inconsistent/cutting off, etc. How do I improve this?

First of all, it is usually better to use *headphones*, as this will isolate what you hear from what goes into your microphone. Zoom and other programs, by necessity, dynamically employ “echo cancellation” to reduce or eliminate the effects of a feedback loop from your speakers back into your microphone. The integrity of the audio signal may be adversely affected in the process. The use of headphones greatly reduces or eliminates the need for the software to manipulate the signal.

Cleanfeed web-based communication software is completely free of such processing, and thus requires the use of headphones. See the section on Cleanfeed for more information.

Other factors are the quality of your internet connection, the condition/age of your computing device, etc.

My instructor and I can hear each other's instruments just fine, but conversation is hard to hear. How can this be improved?

Quite simply, you might need to move closer to your microphone when speaking vs. when playing your instrument, and possibly speak louder and clearer. See the points above regarding microphone placement and input level setting.

I have an electronic keyboard. How do I include this along with my microphone?

The simplest approach is to use the built-in speakers of the keyboard, or connect the keyboard output to an external amplifier. In some cases an external bluetooth speaker is supported. Optimize the balance between your voice and the keyboard as both are captured by your one microphone.

Can I use a Zoom Handy recorder as a USB microphone?

The microphones of a Zoom handheld audio or video recorder (such as the H4n, Q2HD, Q2n 4k, and others) are likely of better quality and flexibility than the built-in microphone of a laptop computer. Each of these devices, and likely many other similar devices from other manufacturers can function as a USB interface for a windows or mac computer. By extension the recorder's built-in mics, or plugged in external mic(s) then become USB mics. Setup details can be found in the manuals, downloadable from manufacturer websites.

My external USB microphone or USB camera/microphone does not provide direct audio monitoring. How can I hear myself better through headphones during applied instrument lessons?

In this case, closed-back or sealed headphones do not work well. Choose an open-back design which allows external sound to reach your ears, blending with the sound from the computer. Or use earbuds that don't seal out external sound. Optionally, remove the headphones when you play your instrument, or wear only one side of the headphones.

USB Microphones: General Notes

Better USB microphones include a headphone output on the casing of the microphone which allows you to more clearly hear your own voice or instrument in real time while wearing headphones. As well, the headphone output of a USB mic will include the computer sound, such as that of instructors or meeting participants.

This also applies to devices configured as a USB mic, such as the portable recorders noted above.

Some camera devices with good mics, such as the Zoom Q2n-4k, provide direct monitoring of audio when the device is configured as a USB mic, but not when used as a USB webcam.

When connected, the USB microphone and its integrated headphone output should be set as the default input and output devices for your computer.

Software platforms such as Zoom Communications and Cleanfeed should automatically choose the system default input and output, although you might still need to specify these as the input and output devices within Zoom, Cleanfeed, etc.

Zoom optimization

If you are using Zoom for instrumental lessons, the “Original Sound” setting is recommended; this minimizes audio treatments that can sometimes distort the audio quality of instruments, and impede two-way conversation somewhat.

If you’re using a microphone with a stereo pattern, such as Blue Yeti, M-Audio Uber, or the stereo microphones of a portable recording device, *stereo sound* can be enabled in Settings/Audio of the Zoom client software. Stereo sound can provide a more realistic image of voice/instrument, especially when the listener is using headphones. As it uses more bandwidth, stereo sound is not ideal for meetings or lectures.

See instructions on the Zoom communications website regarding how to make these settings. Note that if you make a change to your input devices, the Original Sound might revert back to non-original (treated) status.

Fine adjustments: sample rate matching, latency compensation

In some cases there’s a mismatch between the digital sample rates of a USB microphone or similar device and the sample rate of the host computing device. You’ll hear what sounds like radio static or a steady clicking sound when monitoring your microphone input. Consult the manual of your USB device.

If you’re involved in a recording project that uses software such as Reaper, Cubase, ProTools, Logic, or programs such as OhmStudio, the device latency of a USB mic might cause a timing discrepancy between existing content and the recording that you add to it. There are often ways to compensate for this via adjustments in the application software. Consult manuals or other resources such as YouTube for workarounds that apply to your setup.

How can I improve my internet connection?

- If possible, plug your computing device directly into your internet router via an ethernet cable, vs. using wireless.
- If roommates or family members are concurrently active with online gaming, movie streaming, etc., this might adversely affect your personal bandwidth - negotiate?
- Consider turning off video streaming and participating with audio only.
- The Stereo Sound setting in Zoom Communications is nice to use, but it requires more bandwidth. (See Zoom optimization above). Disabling Stereo Sound won’t change the audio quality drastically, but it might improve communication stability.
- Ensure your computer’s CPU is not bogged down with other processes or programs.

I need more specific help!

Department of Music technicians **Russ Baker** and **Pat Strain** will be available for individual consultations prior to the fall term and throughout the year on an appointment basis. Contact Russ Baker, Production Coordinator (rbaker@ualberta.ca).

APPENDIX 1. MICROPHONES.

NOTE: The **SPECIFIC PRODUCTS** listed in this document are only examples, based on what we've actually tested or read about. There are many similar devices on the market, so as long as you have fully assessed your needs and you know a product provides all the necessary features, it should be fine.

TYPE OF EQUIPMENT / SPECIFIC PRODUCTS	IMPORTANT FEATURES / NOTES	PROS	CONS
Microphone: built-in to the computing device		Simple solution Nothing to connect Zero or low extra cost Sometimes simple is good enough!	Usually lowest audio quality Least flexible for placement Least flexible for routing of audio signals Supports only very basic audio recording
External USB mics: M-Audio Uber USB microphone (\$150) Blue Yeti USB microphone (\$200 - \$400)	Both of these are selectable multi-pattern, including stereo capture Integrated headphone output, provides direct monitoring so that you can hear yourself along with audio from the computer Physical controls for mic level and headphone level	Better audio capture than a built-in mic Somewhat more flexible for mic placement No external audio interface is required	USB cables can be short, therefore reducing placement options A separate camera is still needed.
USB microphone: Blue Snowball <i>not tested by us</i>		Not expensive Simple to use Likely decent audio quality	No direct monitoring option. Device latency will be apparent (a slight delay) If monitoring through computer attached headphones.
USB microphone: Shure MV88 microphone	Designed to pair with Apple iOS or Android phones. Kit includes a mount for a smartphone (as the video capture device). An optional USB-A cable is needed for Windows computer. Headphones can be directly attached for direct monitoring.	Reviews are good.	Possible drawbacks of using a tiny smartphone screen, in comparison to using a computer.

APPENDIX 2. HEADPHONES

TYPE OF EQUIPMENT / <i>SPECIFIC PRODUCTS</i>	IMPORTANT FEATURES / NOTES	PROS	CONS
Headphones: <i>Audio Technica ATH-M50x (~\$200)</i> <i>Tested by us</i>	<i>Closed-back design</i> - isolates from external sounds	Good sounding headphones	
Headphones: <i>Beyerdynamic DT990 (\$300)</i>	<i>Open-back design</i> - allows some sound from the room, such as an instrument being played, to blend with the audio from the computer.	Good sounding headphones	
various earbuds	Inherently usually an open design	Inexpensive	Might lack clarity, range or isolation for a focused session
Wireless earbuds: <i>iQ Podz (~\$40)</i> <i>Tested by a friend</i>	Bluetooth Somewhat open design Comfortable and secure ear mount	inexpensive No cables Very reliable connection in one ongoing test	Lasts only 2.5 hours before needing a recharge
Wireless / wired noise-cancelling headphones <i>Sony Noise Cancelling Headphones WH1000XM3 (~\$450)</i> <i>Previous model tested by us</i>	Bluetooth, or plug-in Noise-cancelling, with ambient sound option Latest model has a built-in mic for speaking (not tested)	Good sound and isolation and decent ambient sound feed No cables if via Bluetooth	Expensive This type of headphone possibly <i>not</i> ideal for applied music teaching

APPENDIX 3. CAMERAS

TYPE OF EQUIPMENT / <i>SPECIFIC PRODUCTS</i>	IMPORTANT FEATURES / NOTES	PROS	CONS
<p><i>Zoom Q2n 4K Handy Video Recorder (~\$300)</i></p> <p><i>Tested by us</i></p>	<p>Functions as a live webcam with stereo audio capture on most platforms.</p>	<p>Excellent image and audio capture.</p> <p>Has a physical microphone level control on the side of the unit.</p> <p>Small and lightweight, and mounts easily on a camera tripod or a flat surface.</p> <p>Can serve as a flexible good quality webcam with good stereo audio (see note at right regarding direct audio monitoring)</p> <p>Also is a good standalone video recorder, capturing audio and video onto a micro-SD card.</p>	<p>mic and camera together means less flexibility for separate placement, however the video lens field of vision is adjustable (digitally), and allows the camera to be placed near the subject, putting the forward facing stereo microphone ports in good proximity to the sound source.</p> <p><i>Direct audio monitoring is only available when configured as a USB mic, not as a USB camera</i></p>
<p><i>Creative Labs Live! Cam (~\$70)</i></p> <p><i>Not tested by us</i></p>	<p>Typical external USB webcam - there are many like this, but availability might be a challenge.</p>	<p>Cameras such as this one include microphones that might be of reasonable quality. Look for reviews, and if you purchase, make sure you can return it.</p>	

APPENDIX 4. KEYBOARDS

Note: Many of these keyboards were on sale earlier in the summer. We've listed the regular prices since the sale prices may no longer be valid, but if you're interested in a keyboard but worried about the cost, it's worth checking with the store to see if it's on sale.

Category	Make/Model	Long & McQuade Price	Piano Centre Price	Giovanni's Music Price	Calvin's Comments
BASIC: No MIDI, not weighted	Casio S200 - 61 Key portable keyboard (5 octaves)	\$149.99			
TIER 1: MIDI-capable, non-weighted	Yamaha NP12B - digital piano (61 keys) w/adaptor Click here for details	Purchase: \$249.99 Rent: \$12/mo.			Please note, these types of keyboards are typically non-weighted, but can work really well for theory/transposition exercises. These models are very simple, and don't have too many bells & whistles.
	Yamaha PSR-EW410 (76 keys)			\$770.00	
TIER 2: Basic weighted keyboards (graded hammer action)	Yamaha P45B 88-key digital piano Click here for details	Purchase: \$629.99 Rent: \$40/mo.			
	Yamaha P125B 88-key digital piano w/spkr Click here for details	Purchase: \$799.99 Rent: \$49/mo.		\$1,120.00	
	Roland FP10 (88 keys)		\$759.00		
	Roland FP30 (88 keys)		\$1049.00		
	Roland F140R (88 keys)		\$1599.00		

