ISS Large Lecture Theatre Specification

v1.9

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Contents

This specification must be used in conjunction with the installation guidelines document. Always check the latest documents versions.

A large Lecture Theatre would typically have the following properties:

- Racked seating.
- Guideline size: Over 70m^2.
- Guideline capacity: Over 80 people.

Lectern podium

1. The lectern solution for Large lecture theatres is the TeamMate Educator Twin or equivalent dual rack solution with rise and fall motorized top.

2. The lectern should be installed in front of the teaching wall facing towards the student seating area. The lockable castors must be supplied and the unit should be moveable but left with the castors locked down. It is not envisaged that end users will be able to disconnect the equipment, but consideration must be given to removal of the lectern by AV staff.

3. When providing power to the podium a single power feed to the unit must be used, with the exception of the power feed to the PC which should be separate. It should not be possible for the user of the equipment to power cycle the unit themselves. A PDU with control to reboot all equipment in the rack must be installed. The PDU must be behind the locked door of the cabinet to prevent unauthorised access.

4. Up to 8 network connections will be supplied into the lectern. the use of AV network switches within the lectern are permitted for carrying data such as Dante, Control data ect. that are not required to be on the University network. A sufficient quantity of CAT6 data lines should be provided as patch cables from a connection box in the wall through a channel in the floor to the lectern to allow these to be routed to the equipment.

PC/confidence monitor

5. The installation should provide a suitable 24” display which will act as the PCs monitor as well as providing a confidence monitor for all the AV inputs provided. The Display screen must have the ability to act as an active tablet for control of the PC and annotation of the PC output.

6. The display should be mounted on a double articulated arm on the Lectern. The arm should be adjusted to the appropriate tension to hold the weight of the monitor.

Projector

7. Normally a single 16:10 format projector will be fitted, but when indicated by LU dual source or three projections may be required. The overall intent is to cover as much of the teaching wall as possible, whilst providing easily viewable picture by picture options from any combination of sources in Dual projection rooms. The projector should be mounted from a ceiling-mount pole, the positioning should minimise the potential for the light source to be walked in front of.

   ISS will advise when Dual source or triple projection is necessary. Triple projection refers to a rooms ability to switch from a single source on one projector to dual side by side sources on two projectors.

8. Consideration must be given to whether repeater displays are required to ensure appropriate sightlines of presentation content.

9. Video and control signaling to the projector must run over Cat6 Shielded cable correctly terminated at each end. A second backup CAT6 cable must be installed for each projector.

10. The projector must be provided with the following characteristics:

    - Minimum of 9000 ANSI Lumens.
    - 16:10 projection format.
    - Laser Light Source.
    - Serial control interface providing a control API.
    - Must have support for PJ Link.
    - Support for at least 1920x1200 resolution.
    - Support for projector status information to be transmitted to the control system.

11. Consideration must be given to health and safety regulations covering working at height, in relation to projector maintenance, specifically installation of electrical isolation at low level and access for filter and lamp changes.

12. A 65" Display to act as an additional presenter confidence monitor must be mounted either at the rear of the room or on the side wall to allow minimum safe head height. This display must be controlled with the main display to power on and off with the system, but must not blank content if the main display is blanked.

Projection screen

13. A projection screen must be provided, unless the wall surface and finish is suitable for projection. Normally the screen should be 16:10 format, although other options that use more of the teaching wall may be considered. If electrically operated, the screen should be powered from a fused spur located immediately above the screen and above any false ceiling, sized appropriately to AVIXA Standards for viewing distances. The screen should be controlled from the control system, lowering when the system is powered on and raising when powered off. The control system should allow for the user to raise the screen if needed without a full power down of the projector. Fixed frame or other non-electrical screens should have no borders.

PC

14. Lancaster University ISS will supply a PC to be installed in the Lectern. The PC will take up 3U of rack space.

15. The installer must provide a 3U rack mounted shelf which must prevent the PC from moving back in its rack and also from being removed from the front of the rack.

16. The following parts of the PC must be accessible to the end user; Optical drive, USB ports, Power button.

17. The PC must be powered separately from the lectern to ensure the PC has constant power and not affected from a system power cycle.

18. The PC will be supplied and installed by ISS. The installation must provide:

    a. C13 10A power input.
    b. HDMI or DisplayPort output to video scaler/switcher.
    c. The installer must specify which connection so a PC can be configured.
    d. USB output to interactive display.
    e. USB output to USB socket on lectern connection panel and confidence monitor.
    f. Cat6 Ethernet network connection.
    g. Balanced audio out to audio switcher which may be supplied via HDMI.

Blu-ray player

19. A professional Blu-ray player must be supplied as part of the installation. This should connect to the control system with full bi-directional feedback. In addition:
    - Audio from the Blu-Ray shall be stereo for the program sound; there is no requirement for surround sound.
    - The player must also play compact discs.
    - A multi-region player must be provided.
    - The player must be able to play HCDP protected content, which must also operate with all other equipment in the signal chain.

Visualiser

20. A visualiser must be provided that is capable of 1080p imaging. The visualiser must also:
    - Have at least a 12x powered optical zoom lens.
    - Min 30 FPS.
    - Must fold flat.
    - The visualiser will be controlled via LAN or RS232 and must control, Power on/off, Zoom in/out and light on/ off.

Wireless BYOD mirroring device

21. A wireless connection device should be provided to allow mobile devices to be connected to the display. The device should connect to the LU network and must not rely on using an internal wireless router for connections to devices. The device must be supplied with an Educational Perpetual License.

Video scaler

22. A suitable video scaler or source switching method must be used to switch video inputs. The solution must be HDCP 2.2 compliant and must allow the confidence monitor to enter standby mode when the PC goes to sleep.
23. All sources must be scaled to the native resolution of the projector.
24. It must be possible for the user to blank the feed to the projector whilst leaving the signal displaying on the confidence monitor. This behavior should be repeated for all video sources.
25. A spare HDMI input must be kept available in each room on the switcher to allow for an additional presentation source to be added in future. This input must not be shared with another source and must be able to be switched to via the user control panel.

Audio

26. An audio system to provide program sound should be installed; all program sound signals shall be able to be switched to the program sound speakers.
27. Wall mounted speakers should be installed, which should normally be white unless specified. All input channels must be balanced, and a suitable mix should also be provided to the induction loop.

28. A Sub-woofer is required suited to size of the room.

29. Voice reinforcement is required in the room, with an appropriate number of speakers to provide full room coverage. A Gooseneck microphone with shock mount is required, to be positioned on the lectern.

30. Wall speakers should be of good quality and be supplied with a full back-box and all necessary baffling. Voice reinforcement loudspeakers must not be placed to close to the lectern (source). Where necessary additional wall speakers should be specified for even coverage with appropriate delay. Gain structure and appropriate EQ should be used dependent on the space, to ensure a consistent audio experience without introducing feedback.

31. Voice reinforcement should be provided by four Digital wireless lapel microphone system tuned to the 1.9 GHz Frequency. The units must be supplied with a rechargeable battery pack and desktop charging cradle/device. Monitoring must be available to check power status, battery life and mute status. The receivers must be contained within a 1U rack mounted kit with antennas routed to the front of the unit or other suitable position.

    Note: Aerials must not be situated inside the rear of the Lectern.

32. One or multiple Ceiling Mounted Beam Forming Microphones sufficient to cover the student seating areas must be specified. With appropriate mounting systems and safety cables. These will be used for conferencing and in room voice amplification.

    These requirements will be confirmed on a per room basis by ISS.

    The Beam Forming microphones must have a 'voice lift' feature specified in the model's capabilities. It must also be possible to set priority and exclusion zones for the pick-up areas.

33. Auxiliary lectern audio input for background music not tied to any video input

34. An overall volume control with a programmed default level shall be provided on the control system.

35. Ceiling and wall speakers shall be of good quality and be provided with a full back-box and all necessary baffling. Voice reinforcement loudspeakers must not be placed behind the lectern; An appropriate technology should be used dependent on the space, for example 100v line speakers for longer cable runs.

36. A suitable amplifier shall be provided to power the loudspeakers. Class D Amplifiers with automatic standby mode for power saving must be specified.

37. A Microsoft Teams Certified DSP audio system to provide program sound, Tutor Voice reinforcement, audience microphones for conference feeds to the PC as well as to a laptop via USB should be installed. The USB drivers must be class compliant to avoid the need for vendor specific drivers to be installed. The USB feed must switch between either the PC or a laptop with users able to select which device receives the active USB connection. All microphones must be fully EQd for the room with appropriate gain structures applied to eliminate feedback.

38. Separate audio mixes must be available for the room reinforcement and feeds to USB Devices for recording and conferencing. These must be available via the Control panel Engineer pages. Discrete level control of inputs and outputs with muting per channel available for all mixes.

Assistive hearing system

39. A phased inductive loop shall be provided in the rooms, this should provide a voice signal as captured by a feed from the lapel microphones.

40. The loop system must provide a suitable mix of program sound as well as voice.

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Lectern connectivity

42. The lectern should provide a connection panel for laptop and auxiliary connections, connections provided should include (but may not be limited to):

    a. Laptop HDMI Input.
    b. 1 x Laptop Network RJ45 connections.
    c. 2 x 5a power sockets on control power housing fused separately to the rest of the rack for laptops.
    d. USB Socket connected to PC.
    e. Aux audio input for BGM music 3.5mm audio socket.
    f. USB Connectivity for laptops to room Microphones and Camera.

The input plate must be free from Installer Corporate Branding, logo's and contact details.

For Panel Layout see Appendix B

43. The HDMI leads must be presented through the hinged control panel housing to the switcher input with suitable restraint inside the equipment rack. This is to avoid the need for an input plate so that cables cannot be removed from the room. For servicing the HDMI cable must be coupled within the CPH.

44. The lectern should also provide housing for the touch panel.

Additional audio and video connectivity

45. To allow extra video and audio equipment to take feeds from the presentation system as well as inject signals into the system then additional connectivity is required in the Lectern as well as at the rear of the room, when indicated by ISS.

46. The system must provide the following additional audio outputs terminated on a patch panel inside the rear of the lectern:

    - Left and right program sound output – 2 x male XLR line level.
    - 2 x mixed microphone output – 2 x male XLR mic level.
    - Left and right program sound and microphone mix – 2 x male XLR line level.
    - Dante audio output with Left and right program sound and microphone mix.

    The system must provide the following additional audio inputs terminated on a patch panel inside the rear of the lectern:

    - 2 x XLR female connections into audio mixer for additional program sound source left and right input.
    - 2 x XLR female connection into audio mixer for additional microphone input
    - Dante audio input to DSP.

    The system must provide the following video outputs terminated as follows inside the rear of the lectern:

    - HDMI mirroring projector output for each projector.

- AV over IP output mirroring projector output with mixed audio feed from presentation source and microphones.

The system must provide the following inputs terminated as follows:

- HDMI input terminated in the patch panel.
- AV over IP input from a remote venue.

47. The additional connections inside the Lectern must be presented on rack mounted strips with all connections labelled as Input or Output and signal type. It must be possible for cables to be connected to the sockets and the rear panels or doors of the lectern be closed.
48. Positioning of the rear connection plates, if required, will be confirmed at the start of the project and the connectivity will be terminated as follows:

    - 2 x Cat6 connections from lectern.
    - 4 x XLR connection – 2 male and 2 female from lectern.

49. The remote inputs require a source selection button on the AMX panel. This input must be protected from general use by a PIN popup.

Cameras

50. Minimum of two PTZ cameras are required, and the cameras should have the following characteristics:

    - Controlled via LAN or RS-232C (VISCA).
    - At least 10x Optical Zoom.
    - At least 50 degrees wide angle lens.
    - Simultaneous HDMI or SDI Output and USB 3.0 output.

    One camera will cover the presentation area, the other(s) will cover the audience area.

    Options for automated tracking will be confirmed by ISS for specific projects.

51. It is not necessary for the cameras to have a direct input to the projection system as a presentation source however the PTZ controls should be present on the touch panel. USB 3.0 output, HDMI and SDI video outputs should be presented alongside the additional audio and video connectivity.
52. The camera will be connected via USB to the Teaching PC and a user's laptops when required. PTZ controls must be present on the touch panel with preset recall available to a standard room user, whilst the preset store options are in the PIN Protected Engineer pages.

Whiteboard capture

53. Whiteboard camera capture system with video analytics capability.

Control system

54. A 10” touch panel-based control system will be provided to control all of the audio visual equipment in the room.

    A 10” Touch panel design must adhere to the Lancaster style of touch panels.

55. The control system processor should have appropriate capability for the features of the room. The control system should provide a means of controlling all inputs and outputs of the system as well as interfacing to elements of the room such as a powered screen (if fitted).

56. Touch panel layouts and functionality are outlined in Appendix C.

57. Consideration must be given to minimizing power consumption when devices are not in use either through using devices that enter a low power state when not in use i.e. amplifiers or a Power distribution unit to power of equipment that is not in use.

58. It must be possible to connect a second touch panel device to the system without the need for Lancaster University to make alterations to the control code.

Programming

59. The source code must be handed to ISS upon completion for the purposes of backup and restoration when required.

60. If equipment varies Lancaster University will confirm full functionality of the control system. Before sign off can be agreed the system will undergo full user testing as shown in Appendix D.

61. All firmware must be the latest approved versions as indicated by Lancaster University at the time of install.

62. All code is subject to agreed change control procedures and must not be modified without the express agreement and scheduling by Lancaster University.

Remote monitoring and control

63. The control system must interface with the room management system (RMS) and must provide a minimum of:

    a. Projector or display screen power status.
    b. Source input usage.
    c. Projector lamp hours (if projector present).
    d. Projector filter times (if projector present).
    e. The status of all connected devices.
    f. Remote control of the touch panel (if present).
    g. Power usage.
    h. Error statuses of all connected devices.
    i. Current volume level.

64. The contractor must liaise with ISS to determine the exact requirements of the integration required.

Occupancy Sensor

65. A suitable occupancy sensor to be provided to allow the control system to monitor and control power state. If no activity is detected within the space or does register a button press from the control panel within a programmed time period, the system will be automatically shut down to reduce power consumption.

Building management integration

66. The System must integrate to the buildings fire management system such that in the case of a fire all audio is muted so that sounding alarms can be heard. A message must also be displayed on the Touch panel to see the fire alarm is sounding and that the room must be evacuated.

Lighting and blind control

67. Any spaces fitted with windows will require blind control. This is normally via a relay, but liaison will be required on a per project basis to determine the interface required. The Large Lecture Theatre spaces should normally be fitted with scene-controlled lighting systems. Such systems must interface with the control system to allow the same scene control of lighting as provided by physical controls and the control of any blinds.

68. Consideration should be given to ensuring the visibility of the display screen whilst maintaining an adequate lighting level for viewers.

Cabling and installation

69. All cables entering or leaving the Podium must be protected by a black braided umbilical cord with a moveable distance of approx. 2 metres. There should be strain relief to the umbilical cord of a shorter length than the cord to prevent accidental damage to cables when moving the unit.

70. All cabling should run in suitable containment above the suspended ceiling, in wall voids or under the floor. Permitted containment options include copex, cable baskets or concealed trunking. **Surface mounted trunking and visible cable snakes will not be permitted**.

    - All cabling must be run in suitable containment, e.g. circular polypropylene flexible conduit.
    - It is not acceptable to share a cable conduit with power or data cabling.
    - Where three-compartment shared trunking is used power cabling, data cabling and AV cabling must run in separate compartments.
    - Where individual conduits are installed for AV cabling 40mm conduit is preferred. Two 25mm conduits for AV cabling are also acceptable. This is the minimum requirement, additional conduits maybe requested depending on the number of cables required for the installation.
    - Cables running in ceiling voids must be installed within suitable containment used for AV cabling only sufficient to meet all current fire, electrical and health and safety regulations.

    For Example:

    - Cables should be contained in 32mm Copex, e.g. https://uk.rs-online.com/web/p/conduit/0623710/
    - Fixed to the soffit/slab with metal tie wraps; plastic ties must not be used, e.g. metal tie wraps - https://uk.rs-online.com/web/p/cable-ties/1235035/
    - The metal tie wraps must be looped through flat hanger screws fixed with a nylon wall plug to the soffit/slab at no more than 1m intervals, e.g. https://www.gexpro.com/usg/Root-Category/Fasteners/Fixture-Hardware/Hangers%2C-

Bolts/Screws---Flat-Hanger/Multiple-631-Flat-Hanger-Screw/p/523430

The containment must not be fixed to any existing data cabling baskets or trays as this contravenes the ISS networking installation specifications.

Cables between the floor box and the lectern which should be braided in a black umbilical with sufficient length to allow the lectern to be repositioned.

71. A spare CAT6 cable must be run to each projector and repeater display.
72. All cables must be labelled at both ends with the following information: Signal type, source, destination, e.g. Src – PC, Dest – Switch Input 1.
73. In all cases the floor box should be able to be fully closed; this may necessitate right angle connectors for shallow floor boxes.
74. Final Build schematics showing all devices and connectivity must be provided for video signals, audio signals., control signals as well as the rack build layout.
75. Manufacturer, model, serial numbers and MAC Addresses of all equipment in each room should be provided to Lancaster University as part of the handover process.
76. All Power and data will be provided by a third-party contractor employed by the University. You will be required to work closely with the Electrical contractor to ensure successful completion of the installations.
77. All equipment installed at height must have low level electrical isolation e.g. for each projector, display screen or other powered device.

Whiteboard

78. New vitreous enamel magnetic whiteboards should be provided in each lecture theatre, these should be fixed mounted and cover as much of the teaching wall as possible. In the case of an electric screen then where possible it should avoid covering whiteboards when in use. If a display screen is used then they should be installed either side of the display screen if space allows, otherwise they should be installed on other wall space. Additional whiteboards may be required on walls other than the main teaching wall, dependent on space.

Wireless networking

79. A review of the wireless coverage of each seminar room should be undertaken by ISS Networking and if necessary, additional high-level CAT6 data points should be provided to support wireless access points.

Physical space

80. The room should contain one PoE powered wall mounted Digital LED Clock with 4” digits and take a time signal using an NTP server.

Room Acoustics

81. Considerations must be given to the acoustics of the space in particular ambient noise levels and reverberation times, with appropriate acoustic treatments applied to the walls and or ceiling. A meeting room should have an ambient noise level of no more than 50db and the RT60 (reverberation time) should be less than 1 second. The minimum expected standard is BS8233.

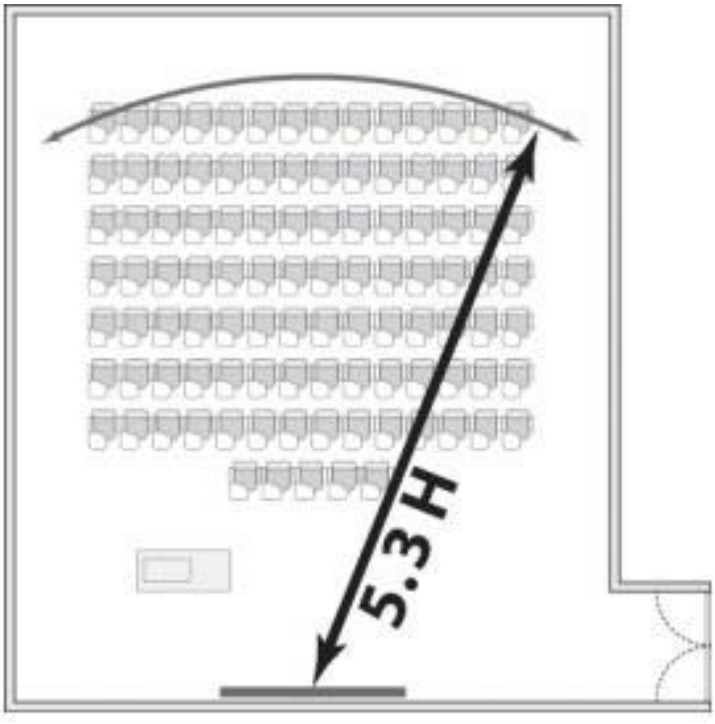
Handover and sign-off

1. Once installation is completed the room must pass the sign-off procedure detailed in Appendix D. This ensures that LU staff have had the relevant training on using the system as well as having inspected all aspects of the installation including but not limited to:

    - Control Programming.
    - Device Connectivity and inputs.
    - Physical installation aspects such as cable labelling.

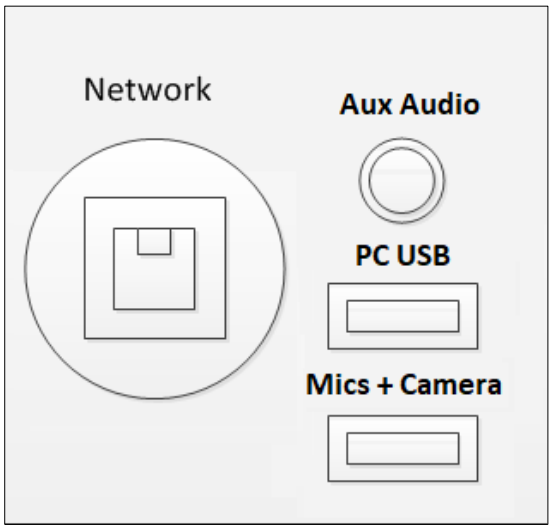
2. As part of the Sign-off procedure LU require full as built schematics for audio, video and control cabling. The control code must also be handed over as well as a copy been left on the controller.

Appendix A – Screen size calculator



The height of the display screen should be no less than the distance from the centre of the screen to the furthest audience member divided by 5.3, i.e. **D / 5.3 > H** (where screen height = H; distance to further audience member = D). *AETM Audio Visual Design Guidelines 2nd Edition Rules for Screen Size and Sightlines.*

Appendix B - Panel layout for input plate



Appendix C - Touch panel layout and functionality

ISS will provide a TP design which can be used to create the desired look and feel of the control system.

Appendix D - Sign-off documentation

All work is subject to final sign-off and approval. All elements of the installation including the control system and interfaces to external systems must be shown as working.

The sign-off documentation will be provided at the start of the project and can also be found here for reference.