

Preparing for an Online ABET Visit

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Abstract

Here we share insights to help those preparing for an online ABET accreditation visit. These insights are gleaned from our own visit which pivoted to entirely online six months before the event. ABET (formerly known as the Accreditation Board for Engineering and Technology) conducted all 2020-21 reviews remotely (online)¹ due to the COVID-19 pandemic. Preparing for an online visit involved (1) preparing the “display room” materials in an online format, (2) pre-recording lab tour videos, (3) conducting live video lab tours via Zoom, and (4) supporting more than sixty video conferencing meetings. All internal team meetings in preparation were also conducted online, with very limited physical interaction. Although an online visit at first appeared it would be logistically easier than in-person, numerous lessons-learned shared here could make the next online visit vastly more efficient.

Background

This paper is based on lessons learned from the 2020-21 ABET accreditation virtual visit for three programs in the LeTourneau University School of Engineering and Engineering Technology: Mechanical Engineering, Engineering Technology^a, and Engineering (with various concentrations). The School includes approximately 30 faculty, 6 staff, and 430 students². Students are invited into the LeTourneau University community “...to nurture Christian virtue, to develop competency and ingenuity in their professional fields, to integrate faith and work, and to serve the local and global community”.³ Although students are expected to participate in chapel and community conduct expectations, unlike faculty students are not required to identify as Christian. LeTourneau University is a private, non-profit, non-denominational Christian university.

Display Materials – Online Archive

ABET documents⁴ specify providing the review team with display materials during and possibly before the visit, consisting of: “**Representative examples of graded student work** including, when applicable, major design or capstone projects.” The glossary further clarifies that Student Work examples should “span the grade range from excellent to poor.”

^a Engineering Technology is within the ETAC of ABET, and the other two programs are within the EAC. This paper refers to both ETAC and EAC review expectations.

Since ABET encourages display materials to be presented electronically, more than a year before the visit our team discussed the strengths and weaknesses of online systems. A paper-based system best fit our needs, in part due to the technical skills of some faculty and the logistics of compiling materials for electronic display. Therefore, we asked faculty to prepare one hardcopy binder for each required STEM course by including a "high, average, and low" sample of every graded assessment (Appendix 1 shows our binder instruction sheet). Based on PEV discussions over numerous visits and guesswork, our binding system was adapted over the years to fulfill the ABET requirement of demonstrating how course outcomes are fulfilled.

Creating course binders is time-consuming for busy faculty, and the pandemic caused the sudden loss of office access and network printing, in addition to courses switching to online delivery. We sent out regular motivational emails to lift the mood and keep the task a priority (Appendix 2 shows an example motivational email).

Due to the pandemic, ABET required display materials to be accessible online one month before the visit. Therefore, we scanned key course binders into PDF files and made the remainder "available upon request" to our ABET evaluators. We also scanned graded examples of student work that each faculty member had tagged as demonstrating fulfillment of key outcomes in each course. We compiled these scans into an electronic "Outcome binder" PDF showing how an outcome was fulfilled across the curriculum, using the structure shown in Appendix 3. For example, ABET Outcome #5 relates to teamwork, so examples of teamwork across the curriculum were all included in Outcome Binder #5. Preparing the outcomes binders electronically was critical due to the impossibility of in-person review, and it saved approximately 10,000 printed pages. Making the materials easily accessible in a PDF required a significant departure from paper-based methods and a large amount of additional work. The short timeline for the change from paper to online limited our options. We organized the PDF document using a system of bookmarks and sub-cover pages within a PDF file. Electronic display materials are not unique to virtual visits, and other institutions have already used other, likely better, approaches with the benefit of more advanced planning. In the future we will plan from the beginning to use electronic display materials both for the efficiencies gained and to avoid the possibility of a sudden change in plans if a virtual review is required.

We found that photographs of tri-fold project boards were adequate for evaluator review. We laid the boards flat on the floor in a well-lit classroom and took pictures, using a mobile scanning app (such as Microsoft Office Lens⁵) to correct for angle distortion.

We organized our display material documents in a directory structure of folders and shared it with our ABET evaluation team using cloud storage (in our case OneDrive). Our EAC evaluation team required transcripts to be transmitted only via the ABET website for security reasons, but other materials were accepted on OneDrive after some adjustment. At the time of this writing the ABET website portal does not allow uploading a ZIP file or creating a folder structure, so a cloud share solution offers dramatically more usability for sharing a large number of files.

Key Lessons Learned for Online Display Materials:

- Plan from the beginning for electronic display materials
- Accommodate faculty who need to prepare paper materials
- Allocate time for the large task of organizing course materials electronically

- Assist faculty collecting course materials with clear instructions and motivational reminders

Lab Tour - Videos and Zoom

ABET required pre-recorded lab tour videos one month in advance of the visit, and a live Zoom tour during the virtual visit. We seriously considered the ABET suggestion of providing annotated photographs⁶ of all major lab equipment, but instead we prioritized recording high-quality videos. Our goal was to provide enough quality in the videos to adequately show the lab equipment available. The ABET website⁷ currently has one sample pre-recorded lab tour video from a cell phone, and more thorough guidance is likely to come after a year of virtual visits.

To record lab tours, each chair or faculty lab manager gave a tour of their respective spaces which a visually gifted administrative assistant recorded on her phone and edited for posting on an unlisted YouTube channel. (A dedicated video sharing site such as YouTube (similar to Vimeo) provided a dramatically better interface than a file share such as OneDrive or Dropbox.) Each tour guide introduced themselves with name and title and stated the building and room names as they entered. This title and location information was also added as text captions using simple video editing software.

To prepare for the live lab tours, conducting multiple practice sessions was critical. This allowed us to establish 1) the order of tour guides, 2) to work out how introductions would be made, and 3) to gain familiarity with the non-intuitive aspects of a Zoom tour. We used one phone for the entire tour, clipped into a hand-held smartphone gimbal stabilizer⁸ (the DJI OM is one example). Based on the results of trial runs, we set the Zoom phone app to show to us full-screen the rear-facing camera view of lab equipment, and to show as a small picture-within-picture the ABET evaluator talking on the Zoom call (shown in Figure 1). We needed significant practice with the Zoom phone app to learn settings that worked well, which are shown in our setup procedure below.



Figure 1: Rear-facing Camera view on Zoom Call, Held with Gimbal Stabilizer

Zoom Live Tour - Main Phone Setup

- Charge: tour phone, backup phone, and gimbal stabilizer
- Phone alerts off (no buzzing, no pop-ups)
- Zoom – set car mode off, virtual background off
- Attach: Un-case phone for secure hold, attach camera-side toward magnet sticker
- Gimbal: turn on with power button long-press
Set Landscape/Portrait view
- Open Zoom meeting on phone
- Spotlight Speaker
- Rear-facing camera view large (double-tap pic; so narrator can easily aim phone)
- Call/Speaker volume set high

Key Lessons Learned for Virtual Lab Tours:

- Allow time for the complexities of pre-recording tours, editing and posting video, and practicing for the live tour
- Designate one device and one person to record all tours
- Designate one device for the entire live tour
- Use a smartphone gimbal stabilizer for stability and improved grip
- Test all equipment and settings in advance (including connectivity along tour route)
- Practice the live tour

Zoom Virtual Meetings

Zoom was the platform specified by the EAC of ABET for all virtual review meetings. Since a different video platform is integrated with our campus IT systems, we needed to significantly increase our Zoom proficiency. Several weeks before our virtual visit we switched all our team meetings to Zoom to gain experience with the interface and the logistics of setting up meetings. Despite extensive experience with another videoconferencing platform, the early switch to Zoom allowed us to solve numerous unanticipated problems with hardware setups, new user controls, and procedures to set up secure meetings with a system not integrated with our campus IT systems.

The logistics of running five parallel tracks for over sixty virtual meetings were complex. Some meetings involved a dozen remote participants and others involved a classroom full of students which required careful setup of the webcam and microphone (Appendix 4 shows our classroom setup procedure).

Each of our evaluators used one single Zoom link for each day, with the waiting room on so they could admit each participant when they had finished the prior meeting. Zoom security features at the time of our visit did not allow designating an external person as host in advance (being “host” is required to admit guests from the waiting room). For this reason, each evaluator had to setup their own meetings, or we needed to purchase a zoom account in which we setup the meeting links and then provided the evaluator with the shared login credentials. (Appendix 5 shows the logistics of using the all-day Zoom links for both single-evaluator and multi-evaluator meetings).

We distributed Zoom links on campus via Outlook calendar invites. We also had one of our office staff available with a master list of links. We setup a spare office for anyone on campus experiencing equipment failure.

Key Lessons Learned for Zoom Virtual Meetings:

- Switch internal meetings to the ABET required platform weeks in advance to gain familiarity
- Specify all virtual visit meetings will use the same meeting system (such as Zoom) and ask evaluators to provide meeting links well in advance
- Test technology setups in advance
- Create a master document to track links, passcodes, and participants for all meetings
- Setup contingency plans for technical and user failures

Internal Communication and Team Psychology

For socially distanced internal communication, we relied heavily on video conferencing for regular team meetings and screen sharing. Without the advantage of consistent co-location, we used email and texting groups for rapid updates, especially during the days of the site visit. Throughout the project we used OneDrive for file sharing. OneDrive offers granular folder sharing permissions, automatic version tracking, and collaborative editing (note that real-time joint editing works much better via the Office web apps than via the Office desktop apps).

The psychology we experienced during the preparations and the review are consistent with a high-stakes project with some published rules and some subjective evaluation. Our team slogan was "Maximizing value and Minimizing burden." Our goal was to do our reasonable best to achieve accreditation renewal without creating excessive work for ourselves and our hard-working colleagues.

Acknowledgements

The authors gratefully acknowledge the contributions of all faculty and staff in the LeTourneau University School of Engineering and Engineering Technology, in addition to student workers and numerous other faculty and staff colleagues from other campus areas. David Dittenber, Scott Anson, Jeff Johnson, and Joonwan Kim worked alongside us on the core ABET 2020 team. In addition, Tammie Ward and Lara Rose provided extensive administrative support. All our efforts built upon the many-decade legacy of LeTourneau faculty and staff who preceded us.

Author Bios

MATTHEW G. GREEN

Matthew Green serves as Associate Dean and Professor of Mechanical Engineering in the School of Engineering and Engineering Technology at LeTourneau University in Texas. His objective is to practice and promote engineering as a serving profession. He has taught and co-developed design courses for all four years of the undergraduate curriculum, and has also taught courses such as Dynamics, Thermodynamics, and Machine Design. Past projects include remote power generation, design methods for frontier environments, enhanced engineering learning, and assistive devices for persons with disabilities. He coordinates ABET accreditation activities for LeTourneau University.

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- ⁴ ABET, "Accreditation Policy and Procedure Manual (APPM) 2020-21," from Section I.E.5.b.(2), Materials and Glossary definition of "Student Work Examples", <https://www.abet.org/accreditation/accreditation-criteria/accreditation-policy-and-procedure-manual-appm-2020-2021/> [Accessed: Jan. 17, 2021].
- ⁵ "The Best Mobile Scanning Apps," Sept. 15, 2020, <https://www.nytimes.com/wirecutter/reviews/best-mobile-scanning-apps/> [Accessed: Jan. 17, 2021].
- ⁶ ABET, "Facilities — Annotated EAC Photos," <https://www.abet.org/accreditation/accreditation-criteria/> [Accessed: Jan 17. 2021].

⁷ ABET, "Facilities — Sample EAC Virtual Lab Tour (Video)," <https://www.abet.org/accreditation/accreditation-criteria/> [Accessed: Jan 17. 2021].

⁸ https://www.dji.com/om-4?site=brandsite&from=eol_osmo-mobile [Accessed: Jan 17. 2021].

Appendix 1: LeTourneau ABET Course Binder Preparation Instruction Sheet

ABET Course Binder Instructions (for SEET)

ABET evaluators need a binder for one section of each required class, and we also photocopy some materials for other ABET purposes. Creating binders is an essential contribution to a successful ABET visit, and your efforts are GREATLY APPRECIATED! A special thanks to our supporting computer science, mathematics, and science faculty.

We need your **complete, tagged** binders to the front desk in time to process them. Pro-tip: filling your binder as the semester progresses is a best practice¹:

Fall Courses: **November 25th** (the Wednesday grades are due)

Spring Courses: **May 13th** (or whatever day final grades are due)

What Goes in Each Binder?

1. First, confirm your syllabus ABET outcomes (SOs) and Outcomes Course Grids² are synchronized. For example, if your grid indicates PI 2.2, the syllabus must include SO2. If changes are needed in either your grid or syllabus, mark changes in hardcopy and submit to your Chair (or the front desk) so ABET records can be updated.
2. Include hard copies³ of three samples of every graded item in the course (including grading comments, if any), spanning from higher to lower grades for each assignment (“a range of quality”). For example, if the class has 10 homework assignments, include 3*10 graded samples of student homework (most likely 10 A’s behind the “HIGH” page, 10 B’s or lower, and 10 of the lowest grades.) This may be challenging in very small classes, so do your reasonable best.

BINDER TAB*	WHAT TO INCLUDE
SYLLABUS	Your full syllabus. A course timeline is also fine if you wish to include it.
LECTURES/ HANDOUTS	Handouts, if any, used to <i>supplement</i> the textbook (no need to duplicate textbook materials.) Course outlines, instructions, assignment handouts, reading lists, etc. as applicable. The goal is to provide a clear picture of course material.
HOMEWORK	Three samples of all graded student homework assignments (HIGH, AVERAGE, LOW).
PROJECTS	Project assignment instructions, graded work, presentation slide printouts, grading sheets, etc. as applicable. (HIGH, AVERAGE, LOW).
LABS	Graded lab reports (HIGH, AVERAGE, LOW).
QUIZZES/ EXAMS	All graded quizzes, tests, and exams (HIGH, AVERAGE, LOW).

*Note: leave a section empty if it does not apply, but do not remove the tabs.

(Tagging instructions on back ...)

¹ Another approach is to have students turn in all work at the semester end, and then copy portions to fill the binder. This may work but is not considered a best practice.

² The difference between Outcome Grid *columns* is not important. What matters is which PI rows.

³ For online homework, you may choose to include only hardcopy work. Alternatively, online homework systems often generate summary statistics pages which are sufficient if accompanied by a copy of the assignment.

How to Tag Examples in Your ABET Course Binder (LETU Style)

After your binder is filled, tag an **example** “evidencing” each Performance Indicator (PI) that is X’d in the matching Outcome Course Grid. For example: if your Grid has an “X” for PI 1.1: “*Identify and develop the problem to be solved*” you could tag a quiz problem showing this (regardless of whether the X’d column is “homework”, “lab”, or otherwise).

All tagged examples will later be photocopied by student workers and grouped by performance indicator. For example, one binder will contain photocopies of all PI 2.1 examples tagged across all course binders. This demonstrates for ABET how courses prepare students for PIs and therefore Student Outcomes. Every course binder will also be on display during the ABET visit.

1. How Many Examples to Tag

For each PI marked in the **Course Grid** (these must be the same SOs as your syllabus):

- 1.1. **Tag 2 examples** if possible for “RARE” ENG-PIs: 2.2, 4.#, 7.#; or ETECH-PI 2.2.
- 1.2. **Tag 1 example** for **all other PIs** (no extras, please, even if multiple columns are X’d).

2. What Examples to Tag

For each PI marked in the **Course Grid**, tag in this order of preference:

- 2.1. **The clearest example of student work.** (Preferably graded “high” scoring.)
- 2.2. Lecture slides or notes. (*Only* if no student work is available.)
- 2.3. A statement that this PI was covered in lecture. (*Only* if neither of the above exist.)
- 2.4. If it is not clear how the example satisfies the PI, include an **explanatory note**.
- 2.5. If a PI checked in your Course Grid was mistakenly not covered, (oh NO!) talk with your chair ASAP. We may need to update the Course Grid and syllabus.
- 2.6. For PIs 1.1 and 1.2, small is better (e.g. one graded page of a quiz or exam).
- 2.7. For PI-1.3: Complex Problems⁴ or Broadly-Defined⁵, ask us if what to tag is unclear.
- 2.8. The same example work can be used for multiple PI’s if it applies.

3. How to Tag Examples

- 3.1. Write the PI number (e.g. ENG-PI 7.2 or ETECH-PI 4.1) on a **3”x3”** post-it note.
If the course has two outcome grids, distinguish PI’s with the prefixes ENG (for grids with 7 total SOs) and ETECH (for grids with 5 total SOs.)
- 3.2. Write page sides to copy (e.g. “3 sides” is 3 single-sided pages or 1.5 double-sided.)
- 3.3. Attach the post-it to the example, such that the **writing is visible above** the binder top.
- 3.4. Paperclip if needed to emphasize when multiple pages should be copied.
(Include your assignment sheet in the paperclip **only if needed to show why** the student work addresses the PI claimed.)

Contact: Matthew Green, Tammie Ward, or your Department Chair.

⁴ ENG: **Complex engineering problems** include one or more of: (a) involving wide-ranging or conflicting technical issues, (b) having no obvious solution, (c) addressing problems not encompassed by current standards and codes, (d) involving diverse groups of stakeholders, (e) including many component parts or sub-problems, (f) involving multiple disciplines, or (g) having significant consequences in a range of contexts.

⁵ ETECH: **Broadly-defined activities or problems** are practical, broad in scope, relatively complex, and involve a variety of resources; use new processes, materials, or techniques in innovative ways; and may require extension of standard operating procedures.

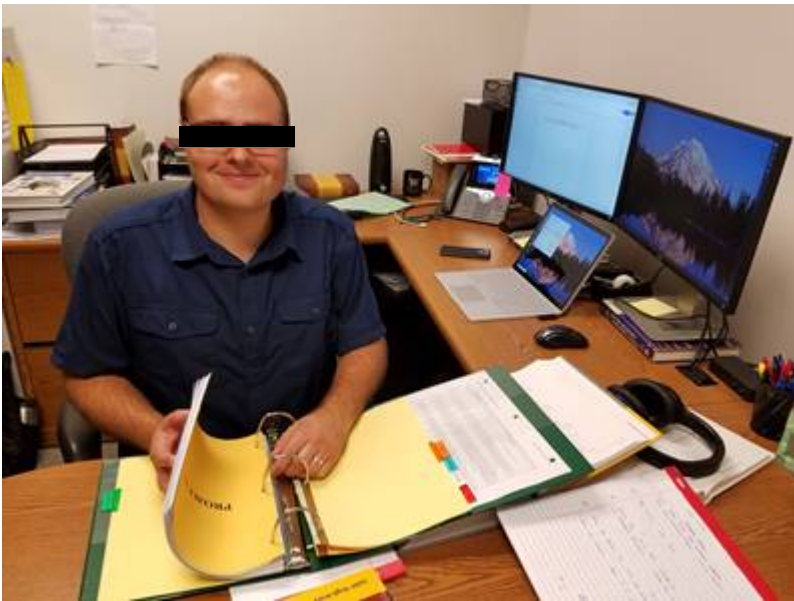
Appendix 2: Motivational Email Promoting Course Binding (Example)

ABET Binder Inspiration - Week #6!

Subject: ABET Inspiration - week #6
Attachments: ABET Course Binder Instructions v1b.pdf

This is Andrew's first time building ABET binders, which he says is much easier than writing a dissertation.

He likes to get out in front of it, stating, *"Every 3 minutes now [filing my binder] saves me 10 minutes later!"* Andrew is also enjoying spending time with his Bride and adorable children.



(Andrew gave me permission to share this photo)

Thank you all for your contributions to this important work.

Matthew G. Green, PhD
Associate Dean and Professor
School of Engineering and Engineering Technology
LeTourneau University | office: 903.233.3900 or .3912

Note: items redacted from original email for privacy.

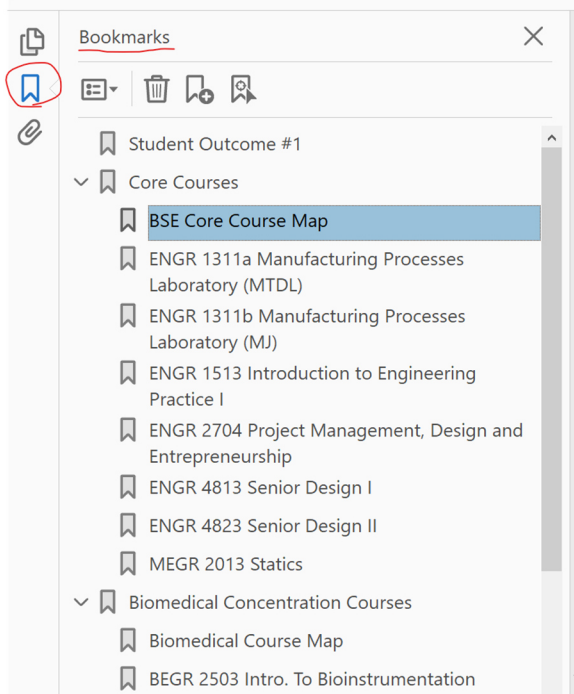
Appendix 3: ABET PDF “Outcome Binder” Structure



ABET Student Outcome Examples: Navigation and Structure

Navigating the PDFs

1. PDF Bookmarks (pictured below) include click-able links
2. Footers on example student work identify the outcome and performance indicator e.g. "OUTCOME 1: PI 1.1"
3. ALT + LEFT-ARROW key combination moves back through each prior view



Structure of each PDF: Student Outcome Examples

Student Outcome #1 (one PDF per outcome)

- 1) **PROGRAM CORE** (Purple Cover + Outcomes Map)
 - a) **Course #1 (Green Cover)**
 - i) Example #1*
 - ii) ... Example n
 - b) **Course #2 (Green Cover)**
 - i) Example #1*
 - ii) ... Example n
 - c) **Course n**

- 2) **PROGRAM CONCENTRATION #1** (Purple Cover + Outcomes Map)
 - a) **Course #1 (Green Cover)**
 - i) Example #1*
 - ii) ... Example n
 - b) **Course #2 (Green Cover)**
 - i) Example #1*
 - ii) ... Example n
 - c) **Course n**

- 3) **PROGRAM CONCENTRATION n**
 - a) ...

*Page Footers denote performance indicator e.g. "OUTCOME 1: PI 1.1"

Appendix 4: Classroom Setup for Zoom ABET Interview

Please note: although the details below are classroom-specific, we share these as an idea to reduce the stress and errors under time-pressure of rapidly re-configuring a live lecture class into a Zoom meeting with ABET evaluators.

1. Install Zoom

- a. By clicking meeting link (in Outlook calendar)
(Alternative: <https://zoom.us/download> and click first "Download")
(If meeting link unavailable, manually enter meeting ID and/or passcode)

2. Audio/Video Setup:

- a. Gooseneck webcam – place just under projector screen
- b. Speaker = "EXTRON..." (the podium volume knob controls room speakers)
- c. Mic. = "MAONO..." (black pancake mic; sometimes fails audio check but works)

3. **WINDOWS-KEY + P** >> "Duplicate" (puts Zoom on the projector screen)

4. *LETU faculty/staff should leave the room during the ABET interview

5. After:

- a. **WINDOWS-KEY + P** >> "Extend" (if needed to restore back from "duplicate")
- b. LOGOUT if finished, OR close Zoom and proceed with class
- c. Re-orient camera for next class

Appendix 5: ABET Meetings Planning Grid with Shared Zoom Links

ABET 2020 LeTourneau Visit Master Schedule (Abridged)

Day 1 Oct. 26, Mon.	EAC TC	EAC PEV-BSME	EAC PEV-BSE	ETAC TC	ETAC PEV	Joint Meeting Links
Links	Zoom Link #1	Zoom Link #2	Zoom Link #3	Zoom Link #4	Zoom Link #5	
8:30-9:25 (55 min)	Joint Kick-off: LETU, EAC and ETAC Teams	Joint Kick-off: LETU, EAC and ETAC Teams	Joint Kick-off: LETU, EAC and ETAC Teams	Joint Kick-off: LETU, EAC and ETAC Teams	Joint Kick-off: LETU, EAC and ETAC Teams	ALL: use Link #1
9:30-10:25 (55 min)	Dean & Assoc. Dean	BSME Program and Department Chair	BSE Program Chair	ETAC Dept. Chair and Program Head	Chair of Chem. & Physics	
10:35-11:00 (25 min)	President	Chair of Mathematics	Chair of Chemistry & Physics	President	ETAC Dept. Chair and Program Head	ETAC TC: use Link #1
11:05-11:30	VP Enrollment	BSME Faculty, <name redacted>		VP Enrollment	BSET Faculty	ETAC TC: use Link #1
<...>						
3:55-4:20	VP Student Affairs	Soph. Students (Statics, LH141)	Soph. Students (Statics, LH141)	Chair of Humanities and Social Sciences		EAC PEV-BSE: use Link #2
4:25-5:05	IAC Members, Alumni (EAC programs)	IAC Members, Alumni (EAC programs)	IAC Members, Alumni (EAC programs)	IAC Members, Alumni (ETAC program)	IAC Members, Alumni (ETAC program)	EAC: use Link #1 ETAC: use Link #4
flexible	Debrief Dean & Assoc. Dean	Debrief BSME Chair	Debrief BSE Program Chair	Debrief Dean & Assoc. Dean	Debrief BSET Chair	

Please Note:

*Two-person meetings use that ABET Evaluator's link for the day.

*Joint meetings (blue shading) use the link indicated in the far-right column "Joint Meeting Links"