# AC 2009-406: A SYSTEMATIC PROCESS TO VALIDATE SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMENT CURRICULUM THROUGH ACADEMIC ADVISORY COMMITTEE

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# A Systematic Process to Validate Safety, Health & Environmental Management Curriculum through Academic Advisory Committee

## Abstract

One of the main goals for academic institutions is to prepare students for employment in industry; not only to serve such industry but also to serve our community, country, and the world. It is essential for institutions to align their program outcomes and course objectives with customer (business and industry) needs. Not preparing our students to meet those needs could lead to an unsuccessful job placement and could also negatively affect the credibility of an intuition. Essentially, students who enroll in the program will need to acquire knowledge and skills necessary to become successful in their careers. Therefore in order for us to make our students ready to work in industry, educators will need to fully assess and understand the markets for Safety, Health, and Environmental Management graduates.

The concept utilized by Organizational Leadership and Supervision (OLS) is to request assistance from the professionals working in the field. Based on this concept, OLS program in the School of Technology at Purdue University Calumet (PUC), Safety, Health and Environmental Management has been working diligently with local safety and health professionals by forming an Academic Advisory Committee (AAC). AAC members help review the program to ensure its consistency between curriculums with those skill sets needed by industry. This process is in conformance with the Accreditation Board for Engineering and Technology (ABET) Criteria 4 for 2009-2010 for accrediting applied science programs, which stipulates that each program must have a documented process to regularly assess its educational objectives and program outcomes, and to evaluate that these are being met.[1] The process describe in this paper allows the program to meet this requirement.

Guidance in curriculum validation from professionals in industry is helpful because they know who they need to hire. As Gerald (ERIC) indicated, academic advisory members link the academic community to the external community by sharing their experience after gaining practical experiences.[2] Although various literatures emphasize the essential part of academic advisory members, they have little information as to how to document members' input into a program. In this paper, a systematic process and a tool utilized to validate our curriculum, and the curriculum enhancement process to keep the program current will be discussed. The core item in this paper will be the use of a curriculum matrix tool to identify program outcomes, competencies, and course alignment in the program. This process can be applied to the safety and health discipline and also to other disciplines in the higher education, where program improvements are needed.

**Introduction**

Purdue University Calumet (PUC), is a regional campus of the State University of Indiana. It is located in the northwest part of the state in Hammond, Indiana, a highly urban and industrial area of the state. The campus serves about 9,300 students and it is primarily a commuter campus. The student population consists of about half traditional students and the other half are non-traditional returning students. The Organizational Leadership and Supervision (OLS) Program is part of the School of Technology on the campus, and it hosts three specializations: Human Resources, Supervision, and Safety, Health, and Environmental (SH&E) Management.

Today, we live in a world that is constantly changing, not only in an informational aspect but also in the society as a whole. We constantly see new technology and new processes being introduced; we encounter new problems and issues on a daily basis and we develop new ideas, services, and products for the betterment of the society. Because of these changes, organizations also have to align their operations based on changes to their products, services, processes, materials, regulations, and hiring processes, to name a few.

One of the goals for educational institutions is to prepare students to meet the demand set by the society or industry. Therefore, it is critical that educators must be aware of those changes taking place in industry and to keep abreast their curriculums with new changes implemented by the industry. Moreover, each program within academia will be required to update course objectives and materials constantly, depending on the needs and demands set by the industry and society who benefits from our graduates.

OLS faculties at PUC are fully aware of the importance of this requirement, and have planned a way to keep the institution competitive. One of the processes to keep us competitive is to design our program so that our students will have 100% employment rate after graduation. Forming and collaborating with an AAC to align our program with those requirements set by industries is one of the important steps which SH&E Management major has decided to focus on. Dr. Guthrie, a professor at Central College in Australia also stated that the role of Academic Advisory Board is to provide advice appropriate to the academic activities such as in curriculum design and content, course delivery, course assessment, and evaluation of courses.[3] Utilization of AAC allows an institution to assure the academic quality of courses by monitoring and subjecting the courses to reviews and improvement through a constant cycle.[4]

**Background**

The AAC representing the organizations which employ graduates, and work in the region must be utilized to advise the program in establishing, achieving, and assessing its goals and competencies. The AAC must also, in every educational program, utilize some set of standards to evaluate its curriculum. SH&E Management utilizes a criteria set by the Accreditation Board for Engineering and Technology (ABET), along with experts in the field and a *curriculum matrix* developed by the AAC.

ABET is a recognized accrediting body for college and university programs in technology (also in science, computing and engineering). According to ABET, its accreditation is an assurance

that a college or university program meets the quality standards which are established by the profession for which it prepares its students. ABET accreditation, for example, focuses on a program's educational objectives which are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve: these are then linked to program outcomes, which describe the units of knowledge or skill that students are expected to acquire from the program in order to achieve the program's educational objectives.

## Method of curriculum review

It is critical that the faculty of each program recognize the importance of making its course objectives parallel to those demands set by prospective employers or professionals. Essentially, customers for educational institutions are those companies or industries who would hire our graduates. Therefore, institutions need to know what the "customer" is looking for in our products – "graduates." Initially, a needs assessment must be conducted to determine if any gap exists in the program. Gap can be defined as the difference between "what is" and "what needs to be." In other words, where do our graduates stand and/or how are our graduates perceived by the employers, when measured against the employers' desired abilities in its prospective employees? With these questions as guidelines, SH&E Management attempts to staff its AAC with members who are industrial professionals in the field of safety, health and environmental management. AAC members will be recruited based on their background, their willingness and availability to volunteer, and willingness to help not only the program but also assist those young professionals who seek employment in the field of safety, health and environment.

The model which has yielded the best results for updating the curriculum is patterned after the need to analyze the entire program using the ABET process (even though those standards do not currently apply to the SHE Management in terms of accreditation), but more importantly the use of a systematic tool to analyze the program called *curriculum matrix.* It allows us to systematically evaluate the program curriculum and help improve the program in an efficient manner.

## Identifying Program Benchmarks and Goals

Every program must conduct its own self-examination of everything that gives the program its identity. It is absolutely essential for the program to perform a needs analysis that identifies program benchmarks and goals. In the process of determining where the program is currently, there must be an assessment of the program and the abilities of its graduates to perform their jobs upon graduation. The goals can be determined by the use of input from the AAC members, who can vouch on the capabilities of their employees, who graduated from the program. Also, alumni are extremely helpful with reviewing goals when they have been in the job market for a while. These graduates are excellent sources of appropriate benchmarks. The mechanism which seems to work best in overcoming low response rates in surveys is to make it an easily returnable email survey with just a few essential questions. Since alumni are familiar with the entire program, and are working in the field, they can be an instant source of "gap analysis" for the program, and help with identifying areas for improvement.
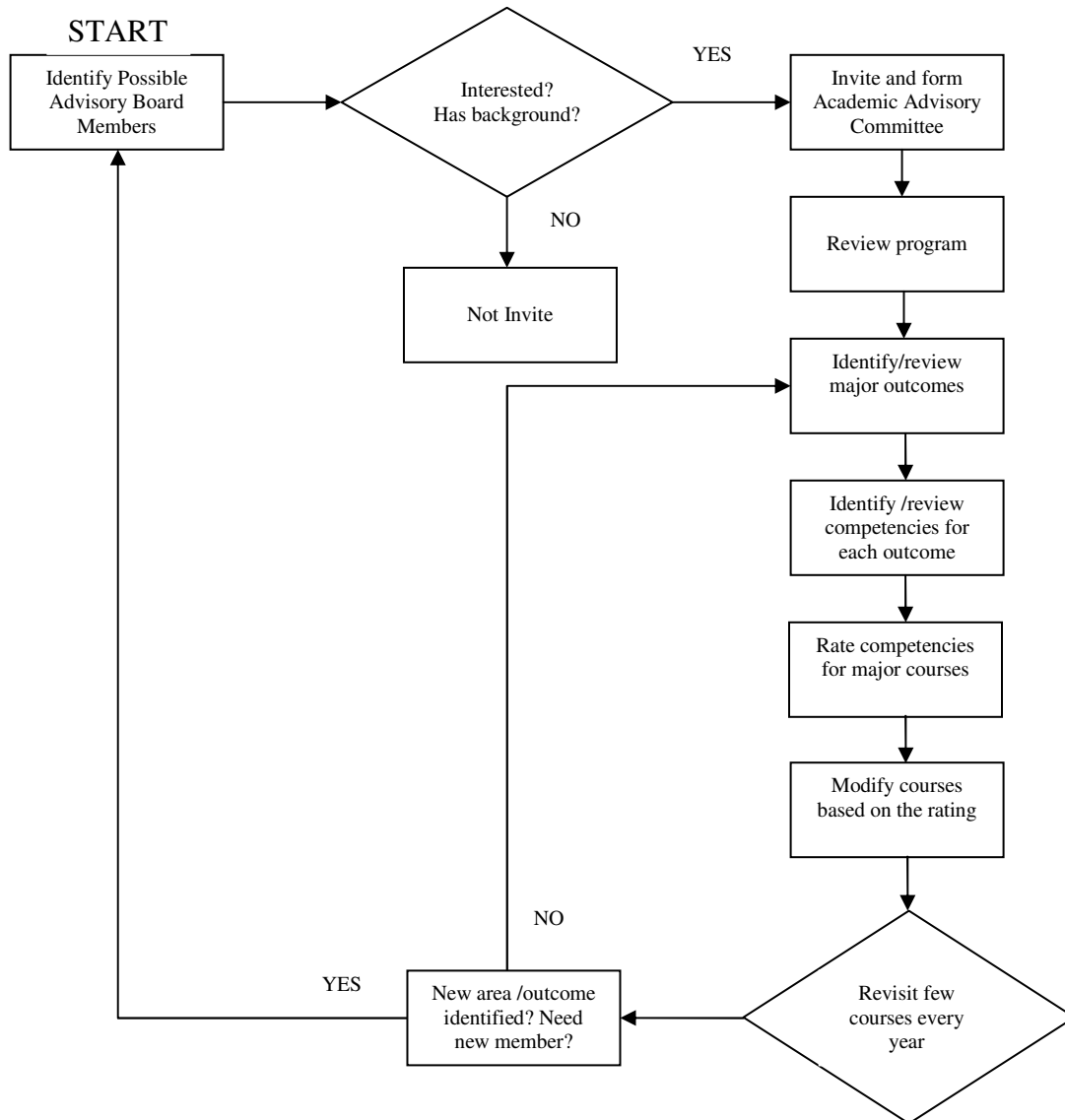
## Curriculum Improvement Process

SH&E Management utilizes the following eight steps to effectively conduct the curriculum examination.

1. Contact and recruit appropriate AAC members.
2. Assign members to identify program outcomes that are essential.
3. Come to consensus of program outcomes with AAC.
4. Assign members to identify competencies required for each identified outcome.
5. Come to consensus of outcome competencies with AAC.
6. Rate and assign each competency for courses in the program.
7. Modify a course based on the curriculum matrix.
8. Revisit three courses every year and revise as necessary.

Chart 1 shows a pictorial view of the steps taken to improve its curriculum by OLS – SH&E Management, followed by detail discussion on these eight steps.

**Chart 1.**

Safety, Health and Environmental Management
Academic Advisory Committee Flow Chart

START

| Identify Possible Advisory Board Members | → | Interested? Has background? | → YES → | Invite and form Academic Advisory Committee |

NO → | Not Invite |

| Review program |

| Identify/review major outcomes |

| Identify /review competencies for each outcome |

| Rate competencies for major courses |

| Modify courses based on the rating |

| Revisit few courses every year |

| New area /outcome identified? Need new member? |   NO

YES

Although the above eight steps will be discussed in detail, it is important to note that these steps can be easily modified depending on each institutional needs. These steps are led by a lead person of AAC, usually the person who coordinates the major or program.

**Step 1: Contact and recruit appropriate AAC members.**

There are various methods that can be looked at, however it is up to each institution to determine an appropriate method of AAC member recruitment. The following describes the process which

OLS – SH&E Management took to develop their AAC.

The first and most important requirement of curriculum validation is to find those experts or professionals who are committed, and interested in helping the program succeed. One of the best sources of advisors is those safety, health and/or environmental professionals in the region who would be hiring our graduates and/or sending their employees to the program to obtain further education. However, it is also important to include those SH&E professionals outside of the region to attain "out-of-the-box" perspectives. When recruiting AAC members, it is critical to search those individuals with different expertise or specialization within SH&E discipline. For example, it would be better to recruit SH&E professionals from various industries such as manufacturing, refinery, construction, health care, service, transportation, government, etc. This is because SH&E is a huge field which requires that each individual who will be working in this field must have been exposed to all possible hazards/issues which they may face in the future. Having members from various industries allow students to learn various hazards in diverse industry.  Therefore, inclusion of SH&E professionals from different industry allow the program to produce well-rounded students in the discipline.

Utilization of alumni of the program, both recent and old graduates, would also be a good source of AAC member recruitment.  Since alumni have actually gone through the program and understand it fairly well, they should be able to recognize the problematic areas in the program. Furthermore, alumni should be able to provide feedbacks to help update the curriculum since they now work in a business or industry. In addition, alumni should be able to present information as to what skills and/or knowledge should be needed or emphasized for future graduates.

OLS - SH&E Management has also recruited members for its advisory board from the local chapters of professional organizations such as the American Society of Safety Engineers (ASSE), as well as various contacts each faculty make throughout the years. The society and other networking contacts have served the purpose of providing a convenient source of knowledgeable advisors but more importantly, these members of professional organizations are usually highly motivated individuals who are current and interested in the field.[5] They also bring enthusiasm as well as knowledge to the process.

One final source of advisors that OLS - SH&E Management uses is the adjunct faculty (also known as limited term lecturers) who apply for part-time teaching positions.  These individuals are well educated and highly motivated not only to teach but also to share their work experience. In addition, they could provide valuable information as they have worked or are working in both the industry and the academia.

It is often time easier to find advisory board members than keeping them or keeping them active in the process.  Too often members and potential members find themselves overcommitted with their jobs and unable to participate fully or attend the scheduled advisory board meetings. Indeed, most members have the intentions to help but the demands of their jobs become an obstacle to provide guidance to the program. To be respectful of board members' time, the authors do suggest sending meeting schedules and discussion items electronically in advance. Although meeting in person would be a preferable means to get together however, our AAC

meets over the conference call due to time constraint on many of the members. This allows each member to participate with ease, and be able to conduct meeting effectively. For OLS - SH&E Management, the initial meeting was held in person while the remainder of meetings have been conducted over this teleconference method or a combination of face-to-face and a conference call to accommodate those individuals who live close and far away to the campus. Upon gathering AAC members, it is suggested that members be informed that they will meet at least once during each semester to evaluate a program.

**Step 2: Assign members to identify program outcomes that are essential.**

As soon as AAC members are selected and established, then the team could move forward with program validation process. During this step, each member will identify those key knowledge categories which graduates will need to know in the field of SH&E. Moreover, AAC members will need to determine major outcomes which they would like to see in our graduates. In the field of SH&E, these would be those sub-disciplines within SH&E such as safety management, construction safety, industrial hygiene, risk management, fire protection, etc. However, these sub-disciplines need to be spelled out by AAC members. This process can be done in advance, by asking members to respond individually with e-mails, which will be combined and reviewed during the meeting. It is important to inform AAC members not to think too much in detail as they are only to list those areas in which graduates will be exposed to.

**Step 3: Come to consensus of program outcomes with AAC.**

Once AAC members identify those key outcomes of the program, it is time for them to come to a consensus as to which outcomes are necessary for the program. This must be done in a face-to-face meeting or through a teleconference call because this step requires interaction between members in order to share their opinions. During this stage, each member will share his/her thoughts, perspectives, and the reasons behind them. As each member has similar background, this process tends to go smoothly and they will be able to come to an agreement quickly. As members are all professionals, any conflict at this step can be resolved easily. Moreover, members could reach to consensus without difficulty by combining topics or modify some wordings in the program outcomes. This step usually takes less time to complete as these outcomes are often established by the discipline. In other words, they all know those major safety components in which people deal with daily. After program outcomes are set up, AAC members will now move to identify competencies or skill sets required to meet each identified outcome. These competencies are much more in detail than outcomes.

**Step 4: Assign members to identify competencies required for each identified outcome.**

Based on identified outcomes, each member will now need to determine what skill sets or knowledge required to fulfill those outcomes. Competencies are the subset of course outcomes which indicate what knowledge or skills required in order for a student to perform better in the field. The term "objectives" may be a better fit. For example, what competencies are required for one to become an Industrial Hygienist? Does a student need to know about hazard assessment, toxicology, ergonomics, etc? Each member will need to investigate from his or her past experience and list them out during this process. As members have their own unique

perspectives, having different backgrounds become critical to this step because they could share their unique know-how with the rest of AAC members.

**Step 5: Come to consensus of outcome competencies with AAC.**

After AAC members have identified key competencies for each program outcome, they will meet again to reach an agreement as to which competencies are necessary for each identified outcome. This process may take some time because each member may have different perspective or experience that could influence his/her input. However, this is where AAC will need to work together and achieve with a consensus, the competencies that would benefit our students, as well as prospective employers.

It is important to note that one of the issues that may arise during this step is that some competencies may overlap with other outcomes. However, it is good to have these overlap because it shows that AAC members are putting emphasis on the issues that need to be addressed strongly in the program. Should this occur, the group will need to balance out the competency placement by moving or combining together some of the competencies.

This step may take some time to complete because of different opinions, beliefs, etc, of some AAC members. However, it is advisable to inform members not to take too much time as they can always modify as necessary. After this step, one should see a curriculum matrix for SH&E Management.

**Step 6: Rate and assign each competency for courses in the program.**

After developing the curriculum matrix or the complete listing of the program outcomes and competencies, ACC members will need to rate the priority of each competency that corresponds to different courses. In other words, each member will be asked to indicate which competency should be addressed in what course, based on the course description given to them prior to this step. Each member will need to rate every single competency identified. The following four rating scale must be use for an entire process. (See Table 1.)

Rating Scale:
      0: Competency not necessary in the course
      1: Low priority value
      2: Medium priority value
      3: High priority value.

**Table 1 – Each AAC member entry example.**

| Outcomes | Competencies | Program Courses | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | OLS 331 | OLS 332 | OLS 333 | OLS 334 | OLS 336 | OLS 337 | OLS 340 | OLS 341 |
| SH&E Management | Build/Implement EHS Management Systems | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 3 |
| | Certification and Standards | 1 | 3 | 3 | 2 | 0 | 0 | 3 | 1 |
| | Contractor Safety | 2 | 1 | 2 | 1 | 2 | 0 | 3 | 0 |
| | International Safety Program Mgt. | 1 | 1 | 2 | 1 | 2 | 1 | 0 | 1 |
| | Motivating and monitoring safety programs | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 3 |
| | Quality principles and Safety (OHAS 18000) | 2 | 1 | 2 | 1 | 0 | 3 | 3 | 2 |
| | Risk Assessment & Management | 3 | 3 | 1 | 1 | 3 | 3 | 3 | 2 |
| | System Safety | 1 | 3 | 2 | 1 | 1 | 2 | 1 | 1 |
| | Techniques of Safety Management | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 2 |
| Industrial Hygiene (IH) | Ergonomics | 1 | 3 | 0 | 0 | 0 | 0 | 2 | 0 |
| | Ergonomics Evaluation tools and guidelines,( E.g.: NIOSH,OSHA,) | 2 | 3 | 1 | 0 | 1 | 0 | 3 | 0 |
| | Hazard Control | 1 | 3 | 1 | 1 | 2 | 1 | 3 | 0 |
| | Hazard Assessment Protocol | 3 | 3 | 2 | 1 | 3 | 1 | 3 | 2 |
| | Industrial Hygiene Principles | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 1 |
| | Industrial Hygiene lab | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 1 |
| | IH and Ergonomics Report Writing | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 1 |
| | Recognition and Evaluation Tools (Control) | 2 | 3 | 2 | 0 | 2 | 0 | 0 | 2 |
| | Toxicology | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 |

Since there will be no right or wrong responses during the rating, each member will need to follow his/her instinct as to which competency is required or essential for which course. In other words, each member will need to rate an entire curriculum matrix base on their experience and their judgment. Once again, it is recommended that each member should not take too much time rating each competency to a course. It may become helpful if the lead person of AAC reminds each member that the rating will be accumulated upon completion.

Once each member rates the competency that corresponds to each course, the lead person or the facilitator will need to accumulate and average out those ratings. In other words, each box which corresponds to certain competency and a course will need to be added, and then divided by the number of respondents.  (See Table 2.)

**Table 2.**

| Outcomes | Competencies | Program Courses | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | OLS 331 | OLS 332 | OLS 333 | OLS 334 | OLS 336 | OLS 337 | OLS 340 | OLS 341 |
| SH&E Management | Build/Implement EHS Management Systems | 10 | 5 | 5 | 3 | 7 | 4 | 5 | 7 |
| | Certification and Standards | 7 | 8 | 7 | 6 | 6 | 7 | 8 | 10 |
| | Contractor Safety | 6 | 5 | 6 | 10 | 6 | 3 | 13 | 6 |
| | International Safety Program Mgt. | 4 | 1 | 2 | 1 | 5 | 2 | 3 | 1 |
| | Motivating and monitoring safety programs | 11 | 6 | 5 | 9 | 6 | 10 | 12 | 3 |
| | Quality principles and Safety (OHAS 18000) | 4 | 2 | 6 | 1 | 4 | 2 | 5 | 2 |
| | Risk Assessment & Management | 10 | 12 | 3 | 10 | 12 | 4 | 10 | 4 |
| | System Safety | 3 | 1 | 5 | 2 | 7 | 3 | 3 | 1 |
| | Techniques of Safety Management | 14 | 3 | 4 | 3 | 9 | 5 | 6 | 2 |
| Industrial Hygiene (IH) | Ergonomics | 4 | 12 | 0 | 0 | 6 | 0 | 2 | 2 |
| | Ergonomics Evaluation tools and guidelines,( E.g.: NIOSH,OSHA,) | 3 | 12 | 1 | 0 | 5 | 1 | 11 | 2 |
| | Hazard Control | 5 | 9 | 4 | 1 | 8 | 5 | 10 | 4 |
| | Hazard Assessment Protocol | **12** | 12 | 3 | 1 | 5 | 4 | 10 | 4 |
| | Industrial Hygiene Principles | 6 | 15 | 2 | 0 | 5 | 3 | 5 | 6 |
| | Industrial Hygiene lab | 1 | 15 | 0 | 0 | 3 | 2 | 1 | 5 |
| | IH and Ergonomics Report Writing | 3 | 12 | 2 | 0 | 3 | 2 | 2 | 2 |
| | Recognition and Evaluation Tools (Control) | 4 | 14 | 2 | 0 | 4 | 3 | 6 | 6 |
| | Toxicology | 4 | 12 | 1 | 0 | 2 | 2 | 4 | 7 |

For example, if there are five AAC members:  member-A, member-B, member-C, member-D, and member-E who are all rating "Hazard Assessment Protocol" competency for OLS 331 course. Member-A believes this competency is low priority for this course, so he/she rates as 1. Member-B feels this competency is very important for this course, so he/she rates 3.  Member-C thinks this competency is medium priority so he/she rates 2. Member-D considers this competency is high priority so he/she rates 3. The last member-E considers this competency to be included in the course so he/she rates as 3.  To obtain the final rating score for "Hazard Assessment Protocol" competency for OLS 331 would be to add each rating given by each member and to divide that total number with the number of members. First of all, one must add each rating to obtain the total.

Therefore, the total would be: 1 from Member-A + 3 from member-B, + 2 from member-C, + 3 from member-D + 3 from member E. The total rating from the five members would be 1+3+2+3+3 = 12. Therefore, advisors rated the importance for this particular competency (Hazard Assessment Protocol) to be covered in OLS 331would be12. This approach will be utilized to rate each identified competency for the courses.

**Step 7: Modify a course based on the curriculum matrix.**

Each instructor teaching the course is now ready to use this matrix to develop or revise their course(s). After obtaining the average rating for each competency, the AAC lead person will identify those competency and courses that received above 80% of responses. Although 80% was used in this process, the cut-off number or percentile can be determined by the AAC members. Those high-lighted priorities will be then become course objectives. Moreover, each instructor who will be teaching each course will need to at least cover those competencies rated highest or highlighted due to majority rating. It is important to note however, that those identified competencies are just the minimum. It means that each instructor who will be teaching the course could teach above and beyond materials that he/she thinks is feasible. This way, we could expose our students to different instructor with different experience. (See Table 3.)

**Table 3.**

| Outcomes | Competencies | Program Courses | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | OLS 331 | OLS 332 | OLS 333 | OLS 334 | OLS 336 | OLS 337 | OLS 340 | OLS 341 |
| SH&E Management | Build/Implement EHS Management Systems | **10** | 5 | 5 | 3 | 7 | 4 | 5 | 7 |
| | Certification and Standards | 7 | 8 | 7 | 6 | 6 | 7 | 8 | **10** |
| | Contractor Safety | 6 | 5 | 6 | **10** | 6 | 3 | 13 | 6 |
| | International Safety Program Mgt. | 4 | 1 | 2 | 1 | 5 | 2 | 3 | 1 |
| | Motivating and monitoring safety programs | **11** | 6 | 5 | 9 | 6 | **10** | 12 | 3 |
| | Quality principles and Safety (OHAS 18000) | 4 | 2 | 6 | 1 | 4 | 2 | 5 | 2 |
| | Risk Assessment & Management | **10** | **12** | 3 | **10** | **12** | 4 | **10** | 4 |
| | System Safety | 3 | 1 | 5 | 2 | 7 | 3 | 3 | 1 |
| | Techniques of Safety Management | **14** | 3 | 4 | 3 | 9 | 5 | 6 | 2 |
| Industrial Hygiene (IH) | Ergonomics | 4 | **12** | 0 | 0 | 6 | 0 | 2 | 2 |
| | Ergonomics Evaluation tools and guidelines,( E.g.: NIOSH,OSHA,) | 3 | **12** | 1 | 0 | 5 | 1 | **11** | 2 |
| | Hazard Control | 5 | 9 | 4 | 1 | 8 | 5 | **10** | 4 |
| | Hazard Assessment Protocol | **12** | **12** | 3 | 1 | 5 | 4 | **10** | 4 |
| | Industrial Hygiene Principles | 6 | **15** | 2 | 0 | 5 | 3 | 5 | 6 |
| | Industrial Hygiene lab | 1 | **15** | 0 | 0 | 3 | 2 | 1 | 5 |
| | IH and Ergonomics Report Writing | 3 | **12** | 2 | 0 | 3 | 2 | 2 | 2 |
| | Recognition and Evaluation Tools (Control) | 4 | **14** | 2 | 0 | 4 | 3 | 6 | 6 |
| | Toxicology | 4 | **12** | 1 | 0 | 2 | 2 | 4 | 7 |

**Step 8: Revisit three courses every year and revise as necessary.**

The last step is to set the curriculum review process as a part of OLS-SH&E Management curriculum improvement process. In other words, implement this review process as part of an

ongoing system so that OLS-SH&E Management could keep up with various changes and demands set by industry. To keep up with these changes and make the program marketable, the program will need to be reviewed every year. As the program has numerous courses to review, it is recommended that they be broken down into several courses and review 3 courses at most in a sequence to avoid overwhelming the board in a single meeting.  Too much review work in a single meeting can have the effect of diluting the amount of review time the board can spend with each course or component. At PUC, AAC will meet at least once every semester and review three courses at most to validate the currency of its curriculum.

## Consensus Decision-making

The author understands that no AAC member wants to sacrifice his or her time suggesting information or ideas that would not be implemented.  The OLS-SH&E Management tries to make sure that members input have direct impact on the development of the major curriculum in the programs. Moreover, each member in the group is given the opportunity to contribute in the discussion of the issues until there is general agreement with result.  This does sometimes lengthen the time needed for the discussions and a final decision; however it has led to well-thought out and thoroughly discussed decisions that keep the advisory committee members coming back.

## Conclusion

Collaborating with industry is not only to meet ABET criteria but it would also benefit the industry, academic institution, and the students in the program. It is essential for an educational institution to identify and understand what the industry or the customer wants in a university graduate. In order to achieve this, OLS-SH&E Management at Purdue University has set the following procedures to keep up the quality of the program. They are: (1) contact and recruit appropriate AAC members, (2) Assign members to identify program outcomes that are essential, (3) Come to consensus of program outcomes with AAC, (4) Assign members to identify competencies required for each identified outcome, (5) Come to consensus of outcome competencies with AAC, (6) Rate and assign each competency for courses in the program, (7) Modify a course based on the curriculum matrix, and (8) Revisit three courses every year and revise as necessary.

This is continuous improvement at its best and it serves to keep the curriculum updated in accordance with the needs of business and industry.  Thus, it provides benefits for all stakeholders from the institutions to the students and to the employers. In addition, understanding the sequence of things helps with the participation.  In order to benefit the board members, and to make the advisory board guidance helpful for the program, the OLS program uses a standard agenda to ensure that every advisory board meeting covers the required areas which need industry input. The agenda can be customized for various needs, but the use of a consistent agenda from meeting to meeting ensures a consistent approach.  Incorporating these suggested techniques to find and retain qualified advisory committee members can yield benefits to any program.

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