Initial Report

Last Modified: 07/02/2012

1. Please complete the following current information about yourself:  Gender:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Male | |  |  | | --- | --- | |  |  | | 21 | 68% |
| 2 | Female | |  |  | | --- | --- | |  |  | | 10 | 32% |
|  | Total |  | 31 | 100% |

3. Year received BS degree

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Number | Male | Female |
| 2007 | 15 | 9 | 6 |
| 2009 | 16 | 12 | 4 |

70. Did you graduate in four years?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 14 | 45% |
| 2 | No | |  |  | | --- | --- | |  |  | | 17 | 55% |
|  | Total |  | 31 | 100% |

71. What factors prevented you from graduating in four years?

|  |
| --- |
| Text Response |
| Trouble getting gen-ed classes needed for the degree early on in the program. |
| Credit requirements and the pace I took credits at |
| I was not fully decided on CBE as a freshman. I wanted to take some history and business classes which all satisfied the same requirements for a CBE degree. I then decided that I wanted to get a business certificate which was an extra 18 credits if I remember correctly. I ended up with many more social sciences credits then I needed and had to take more liberal arts my last few years that were difficult to fit in. Additionally CBE has a pretty heavy course load that really requires you to take the right classes from the beginning in order to graduate in 4 years. |
| I did a co-op that was one semester of college. Additionally I did a business certificate which added 18 credits and essentially one semester as well. |
| Transferring |
| Elective requirements, availability of classes, number of overall credits needed. |
| I did not pick a major until sophomore year so I was behind in course work. I also worked 30-35 hours a week and did not want a heavy course load. |
| Took two semesters off to co-op |
| Study abroad, double major in Chemistry. |
| I transferred from the University of Minnesota and I did a co-op for a semester. |
| Courseload, enrollment in Engineering Honors in Liberal Arts program. |

72. How many semesters of course work did you have (include semesters at any prior university if transferred)?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | 8 | |  |  | | --- | --- | |  |  | | 12 | 41% |
| 2 | 9 | |  |  | | --- | --- | |  |  | | 8 | 28% |
| 3 | 10 | |  |  | | --- | --- | |  |  | | 5 | 17% |
| 4 | 11 | |  |  | | --- | --- | |  |  | | 1 | 3% |
| 5 | 12 | |  |  | | --- | --- | |  |  | | 2 | 7% |
| 6 | 13 | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 7 | 14 | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 8 | 15 | |  |  | | --- | --- | |  |  | | 1 | 3% |
| 9 | 16 | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 10 | 17 or more | |  |  | | --- | --- | |  |  | | 0 | 0% |
|  | Total |  | 29 | 100% |

73. Would you have been interested in an honors program?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 8 | 32% |
| 2 | No | |  |  | | --- | --- | |  |  | | 17 | 68% |
|  | Total |  | 25 | 100% |

4. Are you *currently enrolled* or have you *earned additional degrees* in a graduate degree program?

|  |  |  |
| --- | --- | --- |
| Field: | Institution | Degree Earned |
| Bioengineering | University of Pennsylvania | PhD Candidate |
| Biological Engineering | Utah State University | PhD (in progress) |
| Business | Havard Business School | MBA |
| Business | UW-Oshkosh | MBA - Currently enrolled. |
| Business | UW-Milwaukee | MBA |
| Chemical and biomolecular engineering | University of California, Berkeley | PhD in progress |
| Chemical Engineering | University of Auckland, New Zealand | Masters |
| Chemical Engineering | UT - Austin | PhD Candidate |
| Chemical Engineering | University of Delaware | Ph.D. |
| Chemical Engineering | Purdue University | Ph.D |
| Chemical Engineering | Florida Institute of Technology | MS Chemical Engineering |
| Electrical Engineering | UW-Madison | BS, will earn by Winter of 2012 |
| Medicine | University of Wisconsin School of Medicine | Medical Doctor |

6. Have you taken continuing education or industrial short courses?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 10 | 33% |
| 2 | No | |  |  | | --- | --- | |  |  | | 20 | 67% |
|  | Total |  | 30 | 100% |

7. If you have taken continuing education or short courses, what subjects have you studied? (10 responses)

|  |
| --- |
| Text Response |
| solids processing, solids mixing, combustible dust explosion risks and hazards, static electricity hazards, tableting process |
| Air compressors, boilers, PSM requirements |
| Coating Technology |
| Drying technologies, and accounting |
| Meat 101, Six Sigma training |
| I took a class to help me with taking the Fundamentals of Engineering exam. |
| Business Management |
| CHEMCAD |
| Packaging Engineering; Music |
| Paper Science, Coating Technology |

8. Why did you choose the your continuing education or short course subjects? (9 responses)

|  |
| --- |
| Text Response |
| required or helpful for work required at career |
| business need at current position |
| Company offered for the position I was in |
| Improve my knowledge base in relevant areas to my employer. |
| Directly applicable to my job |
| I took it, because it is a prerequisite for a Professional Engineering License. |
| To improve my management skills |
| Packaging courses were taken for work, and music are taken for personal fulfillment. |
| Job-specific education |

9. Are you currently employed?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 27 | 87% |
| 2 | No | |  |  | | --- | --- | |  |  | | 4 | 13% |
|  | Total |  | 31 | 100% |

10. Please describe the reason(s) why you are not currently employed (4 responses).

|  |
| --- |
| Text Response |
| I am a PhD student. |
| Graduating from the Harvard Business School. |
| Currently awaiting our first child and was unhappy with my previous position. |
| I am currently in graduate school working towards a PhD. I do have an NSF Graduate Research Fellowship which pays me for work as a graduate researcher during my schooling. |

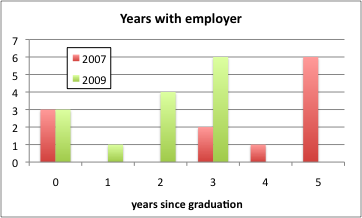
11. Name of company or institution

|  |
| --- |
| Text Response |
| 3M | Georgia-Pacific |
| ABS Global | HPD, LLC |
| Abu Dhabi Polymers Co. (Borouge) | Kraft Foods |
| American Transmission Company | LyondellBasell |
| Appleton Papers - Encapsys | Mainstream Engineering Corporation |
| Aquatech International Corporation | Purdue University |
| Cargill Inc | Sigma-Aldrich |
| Clorox | The Probst Group, LLC |
| Clorox | U.S. Navy |
| DuPont | United States Gypsum |
| Ecolab | University of California, Berkeley |
| Epic | University of Iowa Hospitals and Clinics |
| Flint Hills Resources | University of Texas - Austin |

12. Click the description below that best characterizes your current employer.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | fewer than 100 employees | |  |  | | --- | --- | |  |  | | 2 | 7% |
| 2 | 100 to 1000 employees | |  |  | | --- | --- | |  |  | | 5 | 19% |
| 3 | greater than 1000 employees | |  |  | | --- | --- | |  |  | | 20 | 74% |
|  | Total |  | 27 | 100% |

13. How many years have you been with this employer ?



14. What is your current job title or position?

|  |
| --- |
| Text Response |
| Chemical Engineer - Process Engineer |
| Project Leader |
| Process Engineer |
| Graduate Research Assistant |
| Ensign |
| Engineer |
| Anesthesiology Resident Physician |
| Senior Scientist |
| Utilities Supervisor |
| R&D Engineer |
| Engineer, I |
| Operations Engineer |
| Engineering Specialist |
| Senior process and commercialization engineer |
| Process Engineer |
| Lead Operations Engineer - Polypropylene |
| Graduate Student |
| Graduate Student |
| Packaging Engineer |
| Technical Services |
| Process Engineer |
| Process Engineer |
| Chemical Engineer |
| Project Engineer |
| Process Engineer |
| Packaging Development Scientist |
| Process Engineer |

15. Which kinds of materials, substances, and products does your work involve?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Agricultural or bioprocess high volume materials | |  |  | | --- | --- | |  |  | | 3 | 12% |
| 2 | Consumer products | |  |  | | --- | --- | |  |  | | 8 | 31% |
| 3 | Electronic materials or devices | |  |  | | --- | --- | |  |  | | 2 | 8% |
| 4 | Food products | |  |  | | --- | --- | |  |  | | 2 | 8% |
| 5 | High volume chemicals | |  |  | | --- | --- | |  |  | | 1 | 4% |
| 6 | Metals/minerals | |  |  | | --- | --- | |  |  | | 1 | 4% |
| 7 | Petroleum, fuels, primary petrochemicals | |  |  | | --- | --- | |  |  | | 3 | 12% |
| 8 | Pharmaceuticals/biologicals | |  |  | | --- | --- | |  |  | | 4 | 15% |
| 9 | Polymers | |  |  | | --- | --- | |  |  | | 4 | 15% |
| 10 | Pulp and paper products | |  |  | | --- | --- | |  |  | | 3 | 12% |
| 11 | Specialty/fine chemicals | |  |  | | --- | --- | |  |  | | 2 | 8% |
| 12 | Other: | |  |  | | --- | --- | |  |  | | 7 | 27% |

|  |
| --- |
| Other: |
| Nuclear |
| Power Transmission |
| Research |
| Waste Water Treatment |
| R&D, Materials, Bioenergy |
| Wastewater Treatment Design |
| Industrial waste water treatment |

16. What are your main job activities?   (% of time for each)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # | Answer | Min Value | Max Value | Average Value | Standard Deviation |
| 1 | Business planning, managerial functions | 0.00 | 50.00 | 6.11 | 11.88 |
| 2 | Economic evaluation | 0.00 | 20.00 | 3.33 | 5.00 |
| 3 | Laboratory research & development | 0.00 | 100.00 | 20.37 | 36.05 |
| 4 | Marketing and product sales | 0.00 | 15.00 | 0.56 | 2.89 |
| 5 | Pilot plant process development | 0.00 | 70.00 | 7.96 | 16.54 |
| 6 | Plant operations: scheduling and logistics | 0.00 | 50.00 | 4.26 | 12.46 |
| 7 | Process and equipment design | 0.00 | 65.00 | 11.11 | 17.45 |
| 8 | Process operations: monitoring, improvement, and troubleshooting | 0.00 | 80.00 | 16.30 | 25.71 |
| 9 | Product development | 0.00 | 75.00 | 8.33 | 17.65 |
| 10 | Project engineering/management | 0.00 | 70.00 | 11.30 | 15.91 |
| 11 | Software development | 0.00 | 10.00 | 0.56 | 2.12 |
| 12 | Other (chemical engineering): | 0.00 | 20.00 | 0.74 | 3.85 |
| 13 | Other (not chemical engineering): | 0.00 | 100.00 | 9.07 | 22.96 |

|  |  |
| --- | --- |
| Other (chemical engineering): | Other (not chemical engineering): |
|  | anesthesiology |
| Underground Cable Thermal Studies | Electrical Equipment Rating Evaluation |
|  | Recruitment |
|  | Troubleshooting |
|  | Packaging Development |

17. College Preparation

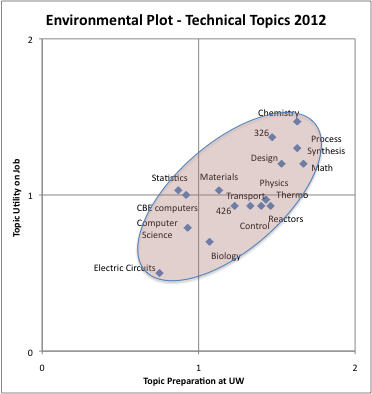
table of raw scores available

18. Professional Usefulness

table of raw scores available

|  |  |  |
| --- | --- | --- |
| **Level** | **Course Preparation** | **Professional Use** |
| 2 | Very prepared | Frequently used |
| 1 | Adequately prepared | Moderately used |
| 0 | Poorly prepared | Not used |

These scores are coded, and presented in an ‘environmental’ plot to compare level of preparation with professional usefulness. If preparation matches professional use, items would be expected to lie on a 45° line from lower-left quadrant to upper-right quadrant.



Items above the imaginary 45° line are used on the job more heavily than the emphasis in the UW CBE curriculum provides, while items below the imaginary 45° line have heavier emphasis in the curriculum than is perceived in job utility scores. Many of these “overprepared” topics are core chemical engineering fundamentals such as process control, reactors, and thermodynamics that support many applications even when they are not the central activities of a job assignment.

Notable in the lower left quadrant is Electric Circuits (ECE 376). This course (and topic) shows these credits broadened into the Professional Breadth elective category.

The course farthest above the imaginary 45° line (largest positive difference between job utility and UW topic preparation) continues to be Statistics. Based on past results, the following comment field (question 20) was added to this year’s survey to gain more insight into how alumni use statistics in their first few years after graduation.

19. Courses not taken at UW

|  |  |  |  |
| --- | --- | --- | --- |
| # | Question | Not Taken | Responses |
| 6 | Electric circuits and electronics (ECE 376) | 2 | 2 |
| 12 | Unit Operations (CBE 326) | 1 | 1 |
| 14 | Reaction Engineering (CBE 430) | 2 | 2 |
| 17 | Computer Problem Solving (CBE 255) | 18 | 18 |

Most of these reports indicate older students who began the curriculum before adoption of CBE 255 in place of CompSci 310 for treatment of programming and numerical methods.

All others had no students reporting not taking course.

20. What aspects of statistics are most frequently used or most important in your profession. (23 responses of 31!)

|  |
| --- |
| Text Response |
| Being a graduate student now, we need to do a lot of data collection. Stat 324 did not prepare me for this. I am currently taking a statistics class that’s called: 'Design of experiments' this type of class would be more useful for UW-CBE undergrads. Data collection and data analysis is the most important aspect. Stat 324 had too much probability in it. |
| Most frequently used to understand process control. Six sigma type projects. |
| I didn't take Stats at UW (AP credit), but I frequently use it. I'm glad I took Circuits to have a basic knowledge and, while useful, it's very rarely come up. Stats most used: determining how big of a sample size is needed for a given confidence level, how to compare Sample A to Sample B and determine significant difference, how to tell if there are interactions within a large sample set, and how to create a Design of Experiments to minimize the number of Cells that actually need to be produced. |
| Process control - Minitab experience would have been very useful. |
| Distribution and Error |
| Analysis of analytical data (significantly different, 6 sigma) and consumer data. |
| Analysis of results of clinical research publications |
| Biggest thing we use is DOEs, followed by ANOVA and t- tests f-tests etc. We also use control charts, capability analysis and do a lot of data transforming. |
| Use statistics during Kaizen events and complex project paybacks. Took a short course on Minitab for process analysis |
| Statistics are used in the context of things you can generate in Excel. Time is also spent looking at averages, sigmas, etc. |
| Deviation, range, Cpk, when looking at product capabilities. |
| I typically only use statistics to determine an average operating parameter and periods of time where the parameter has deviated from the average. I also loosely perform some risk adjusted economic analysis. |
| Statistics is generally not used often only used occasionally to get a rough estimate on loss of life estimates for operating equipment at higher than normal ratings. |
| Currently use six sigma approach for process optimization control charts and capability analysis. Also use basic statics in capacity optimization |
| Six sigma methodologies are heavily emphasized at my current job, and my previous job. I do not recall any exposure to this methodology in college. |
| Statistical comparison methods (t-test, one way ANOVA). |
| For my research I use statistics to analyze data for significance, mainly with ANOVAs or t-tests. |
| Generally statistics used are to evaluate error bars on reaction parameters (rates, orders, activation energies, selectivity, etc.). Use of statistics to generate confidence intervals is most common application, some use of stats as a comparative technique has been discussed, but never fully implemented (as of yet). |
| "Design of Experiment"; establishing how to vary process parameters to identify their effect upon an output. Establishing whether an input has a statistically significant impact upon an output. |
| The statistics curriculum I had fits my current use of statistics. |
| Experimental design is used frequently in development work, and QC-related statistics in new product, process, or packaging qualification. |
| t-tests and process capability |

21. Please comment any “very prepared” ratings.

|  |
| --- |
| Text Response |
| I think all the CBE classes I took made me very prepared. No matter how hard the topic I learned all the material very well. This is credit to the teaching techniques that the CBE professors have. |
| Compared to my colleagues coming from other top schools, Wisconsin by far prepared me better than others in lab courses. The number of hours in lab was significantly more for me, and it showed through in practical abilities both in the laboratory and in the plant settings. |
| The level at which we were taught is above what was required for the industry i entered. |
| UW does a good job of teaching chemistry and physics fundamentals. This helps in the junior and senior level CBE classes since less focus can be on the chem/physics aspects, and more on the fundamentals of that specific CBE class. For the CBE classes I rated highly, these seemed to be the most real-world relevant. I preferred these type of classes over the theory based classes. |
| The last form was confusing. I couldn't understand if you meant I was very well prepared for the course when I took it at UW or if it prepared me very well for my job (in which case it depended on whether or not it was used in my professional job). I understood "very prepared" to mean "felt that I understood the aspects of the class in a way that will allow me to apply the learned concepts in my future professional career." Those classes prepared me well either because the professors were great at teaching or the material was very interesting to me. |
| Relative to other students I have encountered, I feel like the amount of course work I took in chemistry was a fair amount more making me more prepared than most. For thermodynamics I feel like I have a much better understanding of it than other similarly educated individuals, so I must assume I was very well prepared. |
| Good math foundation compared to some other majors. |
| I felt the material covered in the course translated directly to what I am required to do in my job. Work is just a series of open ended homework problems |
| Chemical engineering principles were all very well covered. May have been a little too much into theory but it certainly did not hurt. |
| Many of the classes in our curriculum prepared me very well for the jobs I do today. These courses were all very well taught and the textbooks were well written. |
| My CBE education laid a solid foundation for the underlying principles of thermodynamics, separations, unit operations, and process controls. Being a process engineer, I use these principles daily for monitoring and troubleshooting in a production facility. However, there is quite a disconnect between the level of detail around material presented in these courses and how they are applied in a refinery or chemical plant. |
| The topics rated as "very prepared" were subjects I felt I have gained enough theoretical knowledge to be able to apply in a wide range of problems. Even if we have never studied a specific process, I believe I have the ability to think of ways to approach problems (excellent problem solving skills). The application of basic fundamental chemical engineering principles into my on-job-training has helped me progress quickly in the plant operations ladder. |
| I think the chemical engineering education at UW Madison has a strong focus on chemistry and transport phenomena. I feel as though I was also given a good background in math. |
| My feeling is that the CBE program from UW-Madison had a good basis of what knowledge was necessary for success from both a theoretical and practical application standpoint. My basis is from a graduate education perspective, but I felt like my undergraduate education prepared me well to succeed in graduate level chemical engineering courses, as well as to give me a solid basis for designing and conducting experiments. |
| I felt that I left the classes with the ability to apply my knowledge to an real-life project with minimal additional training. |
| My comments here were based upon two main topics - applicability to the professional world and course quality. I highlighted them because the teachings have come to mind as especially helpful in my most recent work. The course balance (the appropriate amount of information, delivered in the proper order) and instructor quality also play a role. |
| I rated those topics as "very prepared" because I felt that in comparison to colleagues from other universities I was better prepared. I also thought it gave me the building blocks to quickly become effective in my position. |
| The courses that used ChemE principles to teach problem solving really prepared me for my job. While my first assignment was in solids handling and forming processes, which I had learned very little about in school, the basic principles that I learned in many of my ChemE courses helped me learn about new processes quickly and troubleshoot them. In general, my colleagues from Wisconsin seem to be a lot more prepared for anything that's thrown at them because they approach problems differently and than those who were taught to memorize how to execute the same problem over and over. In general, graduates of our program and other Big10 programs have been a lot more successful than colleagues that I've worked with from other schools. |

22. Please comment on “poorly prepared” ratings.

|  |
| --- |
| Text Response |
| Computer science while useful was too general. We studied topics such as rolling dice etc. I would have liked to see more of a direct application. |
| All of the Biology and Biochemistry was basically an afterthought. The professors even knew were forced to be there. I pretty much got B's despite the fact that my test scores did not support such a grade. They wanted us out as much as we wanted out. I wish I would have been better prepared for organic chemistry given that I was in the pharmaceutical industry. However, after you take the course, it is rarely incorporated into class work. Controllers was all about the math behind it. I got to the real world and felt I lacked the intuition to even figure out how to make a PID controller do what I wanted to do without just trial and error. |
| I feel the statistics course i took was not well tied into real-life engineering. I would like it statistics including more statistic software was covered with and engineering (not general) emphasis. |
| Stats I didn't take at UW. I tried to leave it blank. Circuits was a little bit of a joke. You're either a circuits nerd and you get it, or you're not (an no amount of teaching will help you). The class gets very complicated very quickly. A dummy version of circuits would have been more helpful. Biology was also a waste of time. At the time, Cell biology was the only bio required, and I was told by my adviser that I didn't need to take the prerequisites. I was completely lost in that class because it was too complicated too quickly. |
| The concepts were either way too abstract for me to grasp or I really did not appreciate the professor's teaching style (or lack of). |
| To be honest, I don't think I was poorly prepared in materials and polymers in general. But I was poorly prepared for my specific work, which demands a great deal of knowledge in material science. |
| Almost all these classes dealt with teachers who couldn't relate the material to the real world so all the ideas were abstract and non-intuitive or the teachers were just poor at teaching. |
| Computer skills that we learned in school were not the right focus for many industries. More user friendly programs exist than those that were focused on, and learn courses were not taught very well. |
| The topics we covered in class were probably not directly applicable to what I am doing and did not build enough of a base that I wasn't required to learn everything all over again. Or it was too hard at the time |
| I felt Transport Phenomena wasn't presented well. Concepts were difficult to connect/apply and the workload allowed one to easily get lost in details (especially math/calculus tricks) while missing the big picture of the course. |
| Classes do not direct at all in the work I currently do. |
| The topics rated as "poorly prepared" were subjects that I felt that still lack very basic knowledge. Process design for example, should teach the fundamentals of the design or engineering of actual plants. They should focus on the use of correct equipment in different applications (for example, different heat exchangers for different applications s.a. solids, hydrocarbons, combustibles etc) as well as material selection of these equipment. Some practical knowledge such as the pressure ratings of pipes, maximum allowable flow through a pipe and such matters. Familiarization with internationally recognized standards such as ASME and API are essential. The most significant deficiency in my education though lies in the lack of safety awareness. All processes should be designed to be inherently safe. In CBE450, we studied the financial implications/ cost reductions but never paid attention to what really matters - SAFETY! I have also noticed that in the industrial work, "Rules of Thumb" are VERY handy and used almost daily to intelligently make estimations as well as make assumptions about the behaviour or future outcome of a process. |
| I rate ECE 376 as "poorly prepared" because I don't feel the curriculum match what I really needed to know in industry. As a chemical engineer, I needed to know more about how an industrial electrical system function, electric motors, instrumentation etc. I have never needed to know how to design a circuit. I have used very little of what I have learned in this class. |
| Our stats program was very poor. It taught more towards using a program rather than how to apply statistics to understand variability and problem solve. Fortunately, we had a lot of statistics training on the job, but I still felt incredibly unprepared and had to do a lot of studying on the side to catch up. |

23. Please comment on “frequently used” topics.

|  |
| --- |
| Text Response |
| All of the mentioned topics I used in my day to day research during my masters and also my PhD. |
| Most of those courses were fundamentals for engineers that we use everyday. |
| Statistics if very important in my job in determining the significance of results and in ensuring process capability of products/processes. |
| I deal with materials (paper, plastics) and experimental design for most of my work. These classes most prepared me to design and manage project work, including experiments and trials. |
| How do you "frequently use preparation"? I bet a ChE didn't write this survey... I rated the topics as "frequently used in my professional career" because I frequently use aspects of what I learned in those classes in my professional career. |
| My work as a graduate research assistant is in nanomaterials for energy and electronic applications. As such, I must use a lot of chemistry, physics, electronics, and most of all material science. |
| As a prospective nuclear engineer; chemistry, thermo, biology (radiation fundamentals), physics, and math are very widely used |
| In general, laying out process flows, understanding unit operations, and mass balances are most helpful. |
| The core capability of my position is to deliver based on knowledge and experience in that type of work |
| Many of the processes I am responsible for require knowledge to adequately troubleshoot, make improvements or design automation control schemes. |
| We use heat and material balances everyday in my refinery. I also use distillation and learnings from unit operations very often. These classes are really the core. Additionally, I use simulations to often verify plant process data and in these cases knowing simulation programs and how to apply thermodynamics is important. |
| Often looking at product quality. |
| See the "very pleased" description above. |
| The topics have provided support to skills I use on daily or weekly basis. |
| Working in the technical field, use of the basic engineering principles and skills are a part of my daily work. |
| My research is biologically focused so I am often using principles of biology and chemistry in my every-day work. I also use computer-based simulations which rely on math and computer programming classes I took as well as reaction kinetics in a biological setting. |
| In graduate school, my research is focused on kinetics and catalysis, so I use my knowledge from CBE 430 the most frequently. However, I have also encountered some thermodynamics and transport, as well as using knowledge from unit ops/separations to design and analyze my experimental reactors. I also use mass balances frequently to check my results, as well as various definitions of yield/selectivity/etc. as defined in CBE 250. In designing and operating my reactor systems to study kinetics, I find that I use skills and knowledge from all core areas of my undergraduate chemical engineering. |
| I work at a software company, so computer science classes helped prepare me to write and debug code. |
| I selected frequently used for certain topics because they are directly related to my current role. Unit Operations and Process Control, for example, are important aspects of Process Engineering as applied to my process. |
| I rated topics as "frequently used" because I use them everyday. |
| In 5 years, I have worked as a product developer, a packaging developer, and a process engineer, and I have used statistics in all of these roles. I've used stats to understand process variability in the plants as well as DOEs to understand formulaic and material levers in developing new products and packages. I've also used elements from most of my courses- I used thermodynamics to work through combustion chemistry, mass transfer to analyze processes, materials to understand packaging compatibility with formulas, etc. |

24. Please comment on any “not used”ratings.

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| Text Response |
| I wouldn't say that transport phenomena was 'not used' it's more that transport phenomena leads into other classes. Thus, I believe it is fine. Its more that I don't directly apply transport phenomena, however I do use heat and mass transfer, which is related to transport. |
| A lot of the courses (like physics and electrical engineering) were good background, but I didn't use them on a daily basis. I wouldn't have had a deep enough knowledge to actually do anything with them anyway. |
| My field does not require an extensive knowledge of biology. |
| The "not used" topics are just not as relevant to my job and the paper industry. I've done 95% of my work in the area of converting, which uses less chemicals that if I were working on projects for the paper machines. |
| My industry doesn't focus on electronics, polymers, or reactions. |
| I am not required to utilize that in my to fulfill my job responsibilities |
| I do not evaluate circuits and other things taught in ECE376. Additionally, I do not use much of what was learned in Materials because we have other people experienced in that area. |
| Not used do to the fields I have worked in. |
| I don't use the "basic" science courses at all (physics, biology, ECE). Physics does lend into engineering, but on the whole I don't use any of the concepts I learned in those courses. |
| I am in the Electrical industry so only a few of the topics covered in my CBE degree are applicable. |
| Because I did not enter a strictly chemical engineering field I have not had a lot of use for most of my separations, unit operations, or chemical process classes. |
| In general, I don't find much use for my control systems work, as my department has a dedicated instruments guy. Nor do I use much of the electronic circuit analysis (I have however used it in my spare time while messing around with the wiring on my electric guitars). In general, it seems like places that I have worked or am currently working have dedicated people to work in this field. However, I do believe that it is nice to have the underlying knowledge in case of the need to work with people on these systems. As for biology, as my research is in catalysis/kinetics, very much a core ChemE field, I do not find much use for my biology training. |
| If the complexity of the project and dollar value is high my company has taken the approach to higher outside engineering firms to put together bid packages. The engineering firm does most of the design work and the project engineers for the most part are an additional quality check, but not always involved or have the time to do the detailed design work. |
| I work at a software company, so I'm not using any of my core chemical engineering knowledge |
| Biology has not been applicable to my current role. Thermodynamics educated me in ways that are of value, and I may apply it without realizing that it is "thermodynamics", but I have found that the complex mathematics and derivations have not been helpful in my career. |
| I rated topics "not used" if I rarely if ever used information from those topics. |
| In consumer products, there aren't reactors to be designed or compounds to be separated, but they were still worthwhile in teaching me how to think problems through. |

25. Do you supervise the work of other Chemical Engineers?

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| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 6 | 25% |
| 2 | No | |  |  | | --- | --- | |  |  | | 18 | 75% |
|  | Total |  | 24 | 100% |

26. In your view, what deficiencies do entering Chemical Engineers have? (Consider your own start, or other new engineers you have known.)

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| Text Response |
| Lack of communication skills in both oral and written. |
| Experimental design. Everything follows a prescribed procedure in school. Engineers need to know what to do and how to do it to solve a problem in the real world. Summer lab helps UW engineers a bit more given that we had 4 experiments in which we designed. Colleagues from other schools are less prepared. I would recommend having fewer, but more focused experiments. Day 1 could be used to explore the available equipment and determine the method for solving the problem. Day 2 could be used to actually perform the experiment. |
| I think Chemical Engineers are often unable to communicate ideas clearly/ |
| We got too much sleep in high school. |
| No knowledge of computer programs used in the industry. No people management skills. |
| I feel like the greatest deficiency entering chemical engineers have is application and working knowledge. We enter the work force with all this knowledge, and have no real grasp on how to effectively apply it. |
| No "real world" grasp of what actual, practicing engineering do. A lot of what is taught is theory, but the jobs are very different. |
| common sense. Most young engineers come in and cannot quite put the big picture together on how everything fits together. Many also have trouble with the open endedness of the work because they are not quite connecting the dots so they cannot evaluate when its time to stop taking data, or designing their work to take the most important data in the most efficient way without doing the thing to death. To me that is common sense or the connection to the real world. |
| Communication and the idea that I should be able to complete this task on my own. Need to realize that you must utilize your co-workers skills/knowledge to be successful. |
| Lack of knowledge of sensors and gauges and how they work. |
| One area I would have liked to know more was creating macros in Excel. We did not cover this any class and it would be very helpful to have known some of these things earlier. I don't know that we do a great job covering pump/compressor operation either. |
| Previous work experience on a real problem in a non, solely academic environment. |
| The largest deficiency is the ability to translate the concepts learned in school to be practically applied in the real world. Soft skills (working with people, effectively leverage resources to accomplish goals) often need improvement as well. |
| How to integrate the different skills learned from each courses such as thermodynamics, reactions, process design, and process control into one common application as is done in the real world. |
| In general, new engineering students are generally very technically sound with good problem solving and creative thinking skills, as well as solid background in and love of science and math...this is what drives them to engineering in the first place. However, as I mentioned above, many engineers lack skills in effective written communication. There is a stereotype of the engineer as one who loathes English classes, and in some cases this is true. But I think one of the major skills that needs to be learned along the way is that of communication, both written and oral. |
| Communication and accepted documentation methods. |
| Arrogance, work ethic, over-eagerness. |
| Communication skill |
| Lack of mechanical knowledge. Most ChEs have never done any building, fabricating, or other physical work before. A mechanically skilled ChE is very competitive against MEs. |
| Being able to communicate with engineers (and non-engineers) who have years of experience in the field. This includes vendors, manufacturers, and clients, as well. Since a new engineer does not have experience, when they can miss key questions that needed to be asked during meetings/phone calls. A new engineer needs to have strong communication skills. |
| I think the biggest deficiency many entering engineers have is over confidence. I am not sure this can really be addressed by a university, but it is the most common problem with new engineers. |
| Problem Solving: I have so many incoming ChemE's and MechEs who are trying to solve problems in a cookie cutter manner and not realizing that many of the assumptions made in class don't apply in the real world. Also, I see the effects of students who have leaned too much on their TAs in school when they come to me and the other scientists for the answers before even trying to solve the problem themselves. Communicating in writing seems to have gotten worse since I started working. I've had so many poorly written emails, letters, and reports sent to me that were challenging to get through because of how bad the English mechanics were and were painfully verbose. |

27. What are the most important qualities or skills that a Chemical Engineer should have?  Why? (For example: working independently, creative thinking, problem solving, time management, communication, working in a team, intellectual curiosity, confidence in field, ethical responsibility, etc.)

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| Text Response |
| Communication skills are very important, both oral and written. |
| Fundamental problem solving skills. Some engineers need to have management skills because it is TERRIBLE being managed by people that can't see past the reaction on their lab bench and think big picture. |
| Good problem solving skills, the ability to lead and work on a team. |
| A ChemE needs to be knowledgeable in their field and be able to communicate (and dumb down) their knowledge to team members. Being able to communicate and justify decisions and have data to back up decisions is also important. |
| The ability to learn and adapt. No school can even remotely prepare you for what you'll encounter once released in the wild. |
| I think the most important qualities are dependent on what field a chemical engineer goes into. As a PhD student and graduate research assistant I feel like creative thinking and intellectual curiosity are an absolute necessity because discovery is a major part of what we do. If a chemical engineer worked as an engineering consultant than communication, problem solving, and team work would probably be more important. |
| Creative thinking. Problem Solving. Time management. Leadership. Communication (written and verbal). |
| For where I work it is a combination of problem solving, intellectual curiosity, common sense and creative thinking - or what is your approach? We have problems that need to be solved and the most effective way to solve them is to strike the perfect balance between collecting good data and knowing when you are ready to take action or make a decision. |
| Ability to pull in others and work as a part of a team to get things done. Effective communication is absolutely critical for success. Problem solving and creative thinking are also important but not as much as I previously thought, I feel that the drive to get things done, hold others accountable and communication is more important in most roles |
| Problem solving, and being able to setup a series of experiments or tests to solve a given problem. |
| Being able to solve problems, be innovative in ideas for existing processes than can increase profitability, and understanding the core technical responsibilities of an engineer. A fundamental knowledge of heat and material balances is absolutely key to success in my industry. Students should also learn that safety isn't something the industry just talks about because we have to, it is a fundamental part of how we do business. No one should get hurt and all risks need to be properly evaluated and mitigated. |
| Creative thinking, time management, communication, and working in a team because you often have to work with a team to solve a problem with a specific timeline. Also, you often have to be able to communicate with individuals from various levels of a company. |
| All of those concepts are important for chemical engineers. The most critical in my profession are working in a team, creative thinking, problem solving, and self directed. These principles are crucial for an engineer to identify and solve problems as well as work with a variety of people from different backgrounds in a production facility. |
| Problem solving, time management, working in a team, and communication especially since it seems like a lot of engineers lack the social skills to communicate with groups with different educational backgrounds at times. |
| Problem solving skills are essential to find new solutions and not just applying the same solutions as a previous or similar problem they've encountered somewhere along their career. Working in a team, and all that extends from it such as communication and interpersonal skills (soft skills) are also important. Ethical responsibility both in the work that is being done and how the motives behind the person doing it (such as benefit or saving money for the company as oppose to taking shortcuts and risking safety) |
| I do not supervise chemical engineers or work in an industrial setting but I believe chemical engineers should have quantitative reasoning skills, have the ability to work independently and in groups, have an ethical responsibility in the field and have proper communication skills to share their work with others. |
| I think the most important skills a Chemical Engineer should have are those revolving around teamwork: ability to work in a team, communication, etc. I have found myself working with teams many times, or collaborating, so being able to work together with others has been a huge part in my success. However, I also think creative thinking, particularly in the area of research and development (which I find myself in) is paramount. One has to be able to come up with and execute new ideas and then communicate them. Over all, I think communication may be the most important, as it sort of ties everything else together. |
| All of the qualities mentioned above are very important. I would say from person experience the areas I grew the most in and I value very important are Project management, time management, intellectual curiosity to not be afraid to ask questions, because ultimately you need to know exactly what is going on. Basically every thing you work on is a project so you need to be structured in your approach, set realistic milestones, and keep good documentation. |
| Initiative, problem solving ability, effective communication, humility, curiosity, ambition, detail-oriented. |
| leadership, problem solving and analytical skills |
| Project management and time management are very important in the business field. The ability to discern if you have enough information to develop a solution or possible solution - and if you don't have enough information, how do you get that information. |
| I think having a basic understanding of the standard chemical engineering principles and the ability to apply those to real world problems and creatively solve them is very important. It provides the base to improve as an engineer and understand the specific area of work. |
| Problem solving, communication, and time management. |

28. Which skills would you like to see the CBE program encourage or improve on?

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| Text Response |
| I think a year long senior design project for 4 year students would be good. This senior design project should be group based with 3-4 members. Most other chemical engineering programs require that their students do senior design projects. Although I do understand that UW-CBE students are unique in the sense that we have summer lab. |
| More practical applications for what we're doing. I had many ahah moments in industry that explained why I was learning certain things in school. Sometimes the concepts just seem disconnected with reality on why I need to learn it. |
| I think the CBE program should focus more on team/project management as well as communication. |
| Project management! Require an introductory course that includes Microsoft Project, estimating the work breakdown structure, and all the qualities necessary to manage a project. |
| Please improve on reducing the morale of the CBE Professors. I don't really care how much money you can bring to the department or how many papers you have written if you cannot teach, aren't available after class, or are a just a complete asshole with no regard to what I'm paying you for - my education and ultimately my life. |
| Undergraduate research should be a bigger push. Also, I feel like some business oriented classes...specifically communication between scientists and the non-scientists they work with. |
| Communication and working as a team are huge in both my job now, and in the co-op I had during school. The CBE department does a very good job in these aspects as I feel I was always ahead of the curve. |
| Project management. |
| I think you do a pretty darn good job. Nothing jumps out at me. I think statistics should be a topic that is stressed more. It seems like it should be something that is worked into more course work instead of the more limited exposure we would get with the 1 or 2 classes on it specifically. |
| Communication, maybe teamwork (that seems like a difficult thing to teach) |
| Please see above. |
| More encouragement on co-ops and internships and partnering with companies for class projects. |
| Applying concepts to real world problems. Rarely do I calculate the transfer of mass through a thin film, but every day I troubleshoot distillation columns, heat exchangers, process heaters, etc. We spent a lot of time in school working out solutions to the appropriate number of significant digits but process engineering is looking at unit operations on a large scale. Instrumentation basics is another area I didn't know anything about in school which has forced me to learn as my career has progressed. |
| International safety standards Rules of thumb |
| I would personally be interested in seeing the CBE program encourage more students to enter higher education degrees. The CBE department at UW felt to me to be mainly focused on students entering industry and not as much focused on students going on to receive more education. |
| I think more emphasis on communication, particularly written communication, could help. I remember there being a technical communication certificate (which in some ways I wish I had taken), but I think making a couple of those classes mandatory or part of the curriculum might be the best way. I know the department had us write lab reports and give oral presentations, and were often very tough on our skills in those areas, which I am very glad of...I feel like my own technical communication skills improved during my tenure. However, I think having dedicated courses on presentation skills, both written and oral, could help our graduates at the advanced levels. I have always regarded communication as an important part of engineering, and judging by some of the papers that I read and the undergraduates that I have TA'ed for in my graduate work, this is definitely a skill that is lacking around the field. I think UW CBE could be on the forefront by continuing to emphasize this incredibly important skill. |
| Project management and case studies of production issues. |
| "Soft skills"; honestly, there are instructors that could stand to improve on this aspect. Today's successful engineers are able to work effectively in groups and maintain constant communication with others, two skills that are not inherent to some engineers. |
| communication skill and leadership, economic and business development |
| Physical/Mechanical relationship to CBE design work |
| Communication Increased knowledge of typical industrial electrical delivery and control schemes |
| The most important skill I have used is the ability to apply chemical engineering principles to understand different systems and equipment. This includes qualitative analysis and quantitative analysis such as heat and material balances. |
| Problem solving, specifically using stats in problem solving, and communication. |

29. How do you rate the quality of career advising you received in the College of Engineering?

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| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Very adequate | |  |  | | --- | --- | |  |  | | 6 | 23% |
| 2 | Somewhat adequate | |  |  | | --- | --- | |  |  | | 7 | 27% |
| 3 | Somewhat inadequate | |  |  | | --- | --- | |  |  | | 7 | 27% |
| 4 | Very inadequate | |  |  | | --- | --- | |  |  | | 4 | 15% |
| 5 | Not applicable | |  |  | | --- | --- | |  |  | | 2 | 8% |
|  | Total |  | 26 | 100% |

30. How can career advising be improved?  Be as specific as you can.

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| Text Response |
| Don't assign undergrads to professors. Professors are busy people and don't have the time to advise students. Have a dedicated undergraduate advisor for the department. Maybe get a second person to help Linda out. Linda was the most useful person when it came to advising, not the professor. |
| I basically just followed the script for what classes to take. I only met with my advisor because I was required to. Don't really know what to do to change that system. |
| It's difficult to provide information without having an actual experience. Job shadowing, co-ops, internships, and having recent graduates discuss their day-to-day activities in different industries would help. |
| I did not feel that career advising was catered towards ChEs or even much towards engineers in general. Thus, I did not obtain much of it. |
| Help deciding what opportunities are available for chemical engineers, such as manufacturing, quality, R&D, management, sales, etc. |
| Not sure I got specific career advice. The interviewing and resume help was great. |
| I could have used more guidance on how to and how much to push back on employers with job offers. I felt a lot of pressure to accept my position early before other employers had a chance to get offers out there. |
| Have an info session/seminar course early on (concurrently with CBE 250) regarding the different career options or additional education options available after graduation |
| Explain to students what each industry has to offer in terms of career paths. This may be difficult, but some industries are far more technical and geared towards chemical engineers than others. In my case, the oil industry is, in my opinion, the best for a chemical engineer who wants to use what they learned in school. I don't think we promote these jobs very often. |
| Career advising should be made available and well known where to go early on during engineering coursework so that students can plan accordingly throughout their educational experience. |
| ECS is a great resource, but I don't think there was much advising I received. I used the career fairs to find employers and set up interviews. Most of the students I graduated with went into industry, few went into academia. The undergraduate coursework seemed to cater more to those furthering their engineering education and much less toward those going into the work force. In summary, more focus could be placed on preparing engineers for working as well as providing some ideas of the types of companies and jobs available after graduation. |
| By actually trying to cater the requirements or program to tailor to specific industries the student is interested in. Give the program more flexibility with a wider range of topics and class availability. Frequently was under pressure to graduate ASAP so I was unable to take certain desired courses as they were not available to take when the flexibility to take them occurred on a given semester. |
| Honestly this is very difficult unless the individual knows exactly what path/career/field they tend to take in the future. Advice on food and agriculture is very different than petrochemical, oil and gas, or even continuing education/ research. |
| As a student, I had a very specific plan as to where I wanted to go, so I don't think I used career advising to its fullest extent (and this was by my design). However, career advising through the College of Engineering focused a lot on industrial positions, and I think there could be more emphasis given to graduate school, or even alternative schooling options such as perhaps medical school, business school, or law school, for example. Perhaps I am a bit biased, but it seems to me that some students perhaps aren't presented with the options for advanced degrees after undergrad, and only think about what it takes to gain an industrial position. |
| All advisors are busy and it should be up to the student to ask questions, however I was not one of those students. When I think of my interactions with team members I try to ask lots of questions and be supportive. Do professors get training on advising? |
| The career advising is excellent. No issues there. |
| help increase candidate awareness of each industry and job roles |
| I didn't seek out career advising |

31. If you have attended or completed graduate school or are currently in graduate school, please rate how well your undergraduate education at UW-Madison prepared you for graduate study.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Very adequate | |  |  | | --- | --- | |  |  | | 7 | 64% |
| 2 | Somewhat adequate | |  |  | | --- | --- | |  |  | | 3 | 27% |
| 3 | Somewhat inadequate | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 4 | Very inadequate | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 5 | Not applicable | |  |  | | --- | --- | |  |  | | 1 | 9% |
|  | Total |  | 11 | 100% |

32. How well prepared do you believe you are to compete within your field or current area of employment?

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| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Very adequate | |  |  | | --- | --- | |  |  | | 16 | 64% |
| 2 | Somewhat adequate | |  |  | | --- | --- | |  |  | | 9 | 36% |
| 3 | Somewhat inadequate | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 4 | Very inadequate | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 5 | Not applicable | |  |  | | --- | --- | |  |  | | 0 | 0% |
|  | Total |  | 25 | 100% |

33. Please comment on your level of preparedness

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| --- |
| Text Response |
| Very prepared. I think undergraduate research helped and prepared me to be a good graduate student. |
| I'm now in business. My analytical skills (including number crunching as well as systematic problem solving) are infinitely better than someone with no technical background. |
| I feel that I have a more-than adequate technical background to tackle most problems. When I encounter technical problems that I don't understand, i feel i have the ability to learn quickly to solve the problems. |
| The professional career thus far has given me all the tools to excel. |
| I never did undergraduate research and was never really encouraged to do so. However, it would have helped an enormous amount in becoming a PhD student...and I'm 100% confident would help anyone entering fields in research and development. |
| Even though I didn't have any background in food products (which I focus on), learning agility (the ability to catch on to things quickly) really helped. The most important factors are usually soft skills (time management, high capacity for work and learning, etc) are often the deciding factors for employees at work. |
| I felt very prepared to jump into the work I was doing at my job from day 1. I was hired into a group that did solids processing so I had almost no knowledge base but I was an extremely fast learner. I think that was partly due to the very challenging course work that required me to develop that skill. |
| It was no knowledge in particular, I believe my education developed my ability to learn technical items very quickly. Critical thinking and having a drive to fully understand the problem was solidified in my personality as a CBE student. |
| I feel I am completely able of competing with others in my field and my peers. I have a good balance of interpersonal skills as well as a strong technical foundation. One thing students should know is that they need to continue building their technical skills after they receive their college degree as employers expect you to do so. |
| I feel my technical capabilities are on par with those of engineers that attended any university in the country. This is directly due to the education I received in the CBE department. |
| Somewhat prepared since I decided to pursue a field that doesn't directly relate to chemical engineering. |
| -Ability to work and think independently as well as analyze problems and evaluate solutions. Report writing is the foundation of all work in my field. I am confident that my reports are coherent and logically sequenced thanks to my education and all the scrutiny we received during our undergrad. -Confidence in presentation skills. -Excellent use of software programs |
| In comparison to other chemical and biological engineers entering graduate school I was on a very competitive level. I knew as much if not more than other students from a variety of public, private, and technical universities. |
| My undergraduate education has prepared me well mostly due to the rigorous course work at UW. Some people may have thought it was 'too hard,' but I enjoyed the challenges presented, and I think they have prepared me well for anything that may come up in my graduate work or in my future employment. Nothing in the world is truly simple, and by presenting a challenging curriculum, I believe that UW has helped to ease those challenges. |
| I am extremely competitive in my field. No concerns here. The 3 internships I completed prior to graduation aided in this success. I would have preferred better advice in terms of how to prepare for a specific field - i.e. how to prepare for a job in oil refining such that an individual is an "ideal" candidate with the "right" criteria on his/her resume. |
| As my current field of employment is wastewater treatment design, it involves a bit of everything - chemical, electrical, civil, mechanical engineering. So my preparedness for chemical aspect was extremely good; but i wish I had more studies in other aspects of engineering |
| Upon entering the workforce I had a lot to learn but I feel like I was prepared jump in and start learning. More so than some of my peers from other schools. |

34. How does your undergraduate education compare with that of peers in your field from other schools?

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| --- |
| Text Response |
| Advantages, we learned a lot and it stuck with us. The style of UW-CBE teaching was great. Disadvantages: Need more exposure to industry. Make it mandatory for undergrads to do at least one internship/co-op. |
| Truly believe it was significantly better than others. Laboratory prep was the clear differentiator. The rigors on Transport Phenomena, quantum mechanics, summer lab, etc appeared to be much more than other schools. |
| In general i feel i had a great advantage, but because I left academia right away, I would have appreciated a more "real life" approach to some of our classes instead of an academic approach. |
| Madison is still seen as a higher standard institution than other ChemE schools. UW is known as rigorous in their coursework, and for providing individuals who are able to use their brains. |
| A lot of other ChE's from other schools didn't have to take Transport Phenomena as it is a graduate level course or an elective in their school. That didn't hurt them one bit. On the other hand, it kind of jaded me. |
| I feel like my undergraduate education was very comparable to those I work with, all of whom went to excellent engineering universities. |
| Summer lab is not normal, and can get in the way of internships. |
| I feel I was more prepared than other chemical engineers. The experience in summer lab and the effort to include open ended application based work into classes like 426, 250 and 450 are very helpful. Unit ops lab is also a very important class to learn about what you might actually do at a job. I have colleagues who graduate with a ChE degree and have never seen a heat exchanger - I'm glad that was not me. |
| Seems to be better technically, better time management than most. Communication also seems to be better from Wisconsin grads |
| I was better prepared than my peers in graduate school courses, not only in my background knowledge of chemical engineering, but also in my ability to dissect problems which I gained in my undergraduate experience. An experimental undergraduate lab course, like summer lab, offered during the semester but without as many lab reports would have been beneficial to get a better feel for industrial equipment and how to solve problems that are given to you by your manager |
| I would say our experiences were for the most part very similar. Obviously different regions of the country have different core businesses and the ability to expose students to specific industries more. In terms of the detailed equations, problem solving, I would guess we are slightly ahead of most other Universities. |
| Disadvantage - most companies in my current area are focused on mechanical engineers and having a mechanical background |
| Michigan Tech teaches a Process Safety course where they perform calculations like PSV relief and leak rates from a pin hole leak. Again, more practical to a process engineer. |
| Few chemical engineers at my employer so not able to really compare to other schools. |
| Advantage: better understanding of theoretical principles and their application to a wide variety of problems. I feel my peers from other schools were too focused on completing homework and getting good grades (they do not have a curve system) so most of their time was spent doing assignments or complaining instead of the actual process of learning Disadvantage: no practical work experience!! (in my opinion, internships should be mandatory and part of the curriculum) |
| I feel like Madison had a strong undergraduate program and that the level of instruction I received was on par with students from a variety of universities. |
| I honestly think that the education I received at UW was one of the best out there. We go through a much more difficult and rigorous curriculum, which prepares us for the challenges ahead. I work with people from many other top schools, and I think that my level of preparedness either meets or exceeds everyone else’s. Not once have I thought 'gee, I wish I could have gone there.' As for disadvantages, I'm not sure that there are any. The reputation UW has for difficulty may scare off some students, but I think it will invite the top students looking for a challenge, knowing what they can achieve from their success. That is certainly what led me to Chemical Engineering. |
| I have not observed significant differences with other schools. I will say, however, that the UW program appears to be of higher quality/difficulty than others. I believe I have more skills that are more thoroughly developed in certain areas. |
| UW-Madison is a great school. I never thought it would make such a big difference as to what school you go to...but it does! |
| I think that I am equally prepared or more prepared that my peers. I think we are more prepared to independently take on challenges and learn independently (less "hand holding"). I think the difficulty level of the courses and courses like summer lab prepare us to think independently enough to take initiative and be ambitious. |
| My education seemed to much more practical than west coast schools like UC Berkeley and Stanford. The only area that I felt less prepared in than other schools was in Stats. |

35. During your undergraduate study, what subject areas, if any, would you have liked to study more?  Why?

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| --- |
| Text Response |
| Biotechnology. It’s a growing field employing lots of chemical engineers. |
| In hindsight, more PRACTICAL statistics would have been fantastic. They can explain so much. |
| I would have enjoyed the ability to spend more time studying some of the business aspects associated with industry. This would have helped me understand business motivators for the projects I work on. |
| Economics/Finance/Other business type classes. Many of the projects I'm on have technical and a financial decisions. Being able to understand the financial piece is important to me. |
| Women...? No, I'm kidding! A cultural class, or an effective leadership class would have really helped me out. (or a boss-kiss-ass class, for that matter). |
| I would have loved to study energy more, but that's because I love energy! |
| Business. |
| Biology, applications of chemical engineering in biotech fields |
| I liked the design and process stuff the best because I found it to still be interesting when it was very challenging. I think it was also the best preparation for work I do today. |
| Personnel management or team management. More controls material integrated into other classes, simple control strategies for certain unit ops |
| Microfluidics, as more devices are requiring knowledge of fluid flow in small volume chambers |
| Quality control because this is where I have found more jobs in various areas. |
| Economic principles, both as how they apply to engineering and business in general. Almost all of the decisions I make are driven by economics - what makes the most money with the least amount of acceptable risk. |
| Less system control courses. |
| Process Design - I think the course and the project should be separated. Again, use of rules of thumb and basic design principles such as safety are essential. |
| I would have liked to study more biological engineering aspects. Many of the classes we took only focused on chemical reactions and processes but the same theory could be applied to biological processes as well, for instance, reaction kinetics and mass transport are two fields that have a lot of crossover. I think it would have been instructional to see how these theories can cross fields. |
| As one who works with kinetics and catalysis, and has a true passion for that field, I think that I would have liked to learn more about that. I took Prof. Dumesic’s CBE 535 course on catalysis, but I think it might have also been interesting to take a class on industrially important catalysis/reactions, such as highlighting which catalysts are used in which processes. I took a course similar to this with Prof. Nick Delgass at Purdue, and I feel like this was a great supplement to my education. I think it would be very relevant for those students who wanted to go into a reaction engineering type job or were going to work industrially. I think we did a lot of good things at UW, and while we learned many ways to practically apply our subjects, it might have made things more 'real' to have a class or classes where we could learn exactly what processes those particular subjects were most applicable in. |
| Process design with an emphasis on realistic equipment selection and cost estimation. |
| Polymers - it was a very engaging topic, but the courses appeared to be sequestered from the overall program. Bio-engineering - i.e. medical devices, etc. This appears to be a very important field for the future. |
| Transport, reactors, more design... |
| I liked the balance of subject areas. |

36. The CBE degree requires 15 credits of laboratory courses involving Chemistry and Chemical Engineering.  Please rate the value of this laboratory experience to your career and comment on why you rated it this way.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Very Valuable | |  |  | | --- | --- | |  |  | | 11 | 44% |
| 2 | Somewhat Valuable | |  |  | | --- | --- | |  |  | | 10 | 40% |
| 3 | Of limited value | |  |  | | --- | --- | |  |  | | 4 | 16% |
| 4 | Not Valuable | |  |  | | --- | --- | |  |  | | 0 | 0% |
|  | Total |  | 25 | 100% |

37. Please comment on the value of your laboratory courses.

|  |
| --- |
| Text Response |
| Great labs. Both in Chemistry and Chemical Engineering. Although a lot of time was dedicated for lab work it was well worth it. |
| Extremely valuable, but could use more emphasis on the design of the experiment than just executing the experiment. The emphasis on writing standards was also a clear differentiator. |
| I feel some of the more obscure non-chem-e courses were not as useful. ie: o-chem, p-chem. I think that the ability to write reports based on experiments (summer lab) was a huge asset to me. Also, I think some more free-formed labs where we see a problem and have to use a Design of Experiment to find the answer would be very valuable. Statistics could have been applied more to our laboratory courses. |
| Make us design more of our own experiments. It's too easy to predict what's supposed to happen, then make that happen during the current labs. |
| I didn't feel that those courses were structured enough to allow me to fully appreciate them. |
| I found, in general, the lab courses to be repetitive and simplistic, and that the written reports were not practical to real-world experience. |
| Hands-on experience is very important, however, more often than not we have to make up our own experimental design. Summer lab gets at that, but it would be great to have more. |
| I think the lab work is very valuable. Summer lab was the most valuable. Most of the chemistry labs were less valuable - its sometimes just a longer form of high school chem lab. |
| Most of the long-term value in the lab reports. |
| These courses are more about following a procedure and obtaining results then being able to write a coherent, well thought out memo that explains how you reached your conclusions. This is no different than doing a test run in the work place. |
| I rarely work in a laboratory setting. It's good to understand how chemistry labs perform analysis on process samples, but I don't physically do these things myself. |
| The quality of a lab course heavily depended on the TA teaching the course, whether they were prepared enough to teach the material or made it engaging enough to droll up student interest in the material/lab. |
| Not used in my line of work, but when in discussions with the laboratory department I feel that I have some knowledge of their testing methods. I do not feel 'foreign' inside the company laboratory. |
| I thought the laboratory classes were for the most part a valuable part of my education. It allowed you to see the theories you were learning about in the real world. The only part that detracted from the experience within the CBE department was the equipment failure that often occurred, mostly as a result of old equipment. |
| As a grad student, lab classes were extremely important to my education, because they gave the basis for how to design and carry out reasonable experiments. I feel like my experiences in the lab helped prepare me for the individual research that I do at the graduate level by introducing important experimental techniques so that I at least had an appropriate background. |
| Challenging and thorough, but sometimes more "academic" than "real world". Not necessarily a shortcoming, but some of the exercises were irritating because they appeared to lack a purpose. |
| More individual set up of experiments...less of the ones where everything is laid out... |
| Have a strong base in the lab allowed me to become the lab expert at my employer |
| Where I work, we do a lot of R&D work to develop new systems. Having an understanding of how this work is done has been very important. Also, working with some pilot scale equipment was very useful. |
| In R&D, I am always in the lab. The lab classes pushed us both as independent workers and as good team workers. They also taught me how to communicate technical findings clearly and concisely- something that other schools don't seem to teach. |

38. Please rate the value of the summer laboratory course.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Very Valuable | |  |  | | --- | --- | |  |  | | 16 | 64% |
| 2 | Somewhat Valuable | |  |  | | --- | --- | |  |  | | 6 | 24% |
| 3 | Of limited value | |  |  | | --- | --- | |  |  | | 3 | 12% |
| 4 | Not Valuable | |  |  | | --- | --- | |  |  | | 0 | 0% |
|  | Total |  | 25 | 100% |

39. Please comment on the value of summer laboratory course.

|  |
| --- |
| Text Response |
| Greatest course ever. I keep telling people about it and they wished they were at UW. I think I really developed my writing skills during summer lab. Writing both short technical reports and also longer laboratory reports was great. |
| Clear differentiator from my non-UW colleagues. |
| I think the ability to communicate the results of experiments is very important. Developing this skill in summer lab was critical to success. |
| The most valuable part was having to struggle through designing our own experiments. That's what the real world is like. Never once at my job have I had to sit down and follow someone else's instructions step-by-step to reproduce known results. Many times have I had to decide what decision I was trying to make, what information I needed to make that decision, and how to design an experiment to get that information. |
| I do not remember any of that class as it was too condensed and rushed. Therefore, I did not gain much from it. |
| I feel like the informal labs were quite valuable, but the formal ones had a limited value for practical experience. |
| It allows experimentation and hands on problem solving. |
| low value. greatly limited flexibility in pursuing post-graduate education due to timing. |
| I felt I learned the most in this class. Doing the labs on the different unit ops really made the material come alive and left the biggest impression on me when I think back to what I learned in college. |
| Again- most value is in the skills developed is writing the lab reports. The technical side certainly helps to supplement classroom learning but I don't remember many college labs. |
| The most useful course in regards to the practical application of the chemical engineering degree. |
| This allows students an opportunity to design an experiment and really develop some great technical writing skills. Additionally, in my case, having gone overseas I felt like I was able to build more interpersonal skills and balance time between work (school) and having fun. |
| Drives home the concepts taught in unit ops. |
| It was of limited value to me as it proved to be quite the extra load to take on as I had to maintain working 20-30hrs a week to support myself to be able to take/afford the CBE courses. |
| Independency is the best aspect. I really felt as if I was a fully fledged engineer. The report writing was gruesome but was an excellent learning experience. I have learned to scrutinize the reports of my colleagues' and those I manage ensuring correctness and paying attention to the smallest details, from the correct spelling to headers and border width as well as presentability of figures and tables. |
| At the time I thought this requirement was extreme but after taking the course I believe it was an invaluable part of my education. Many of the experiments and theories learned during that time could not have been properly taught in shorter lab courses offered throughout the semester. It was also great for improving on my report writing skills. |
| Summer lab was valuable, particularly from a communication standpoint. It may have been a bit less valuable for me in particular because I had already had experience doing pilot plant operations and designing experiments in and industry setting, and so I felt some things were a little redundant to some of my previous experiences. However, I think for those who may not have had as much hands on experience as I did during their co-op/internships, this course may have been more valuable with regards to learning experimental technique and data analysis. |
| Very difficult, but upon completion provided everyone with a significant amount of confidence. |
| The critiques of technical writing were very helpful. Unfortunately, I believe the course was more about "work" than "progress". The quantity of experimentation and technical writing appeared to be "work for the sake of work". This was disappointing as I am irritated when my time is time wasted. Additionally, the coaching on the technical reports was insufficient. I was expecting better grades, and the grades I received were a "surprise" because the coaching from the instructors on expectations did not give me the appropriate "calibration". Surprising an employee with a review they were not expecting is indicative of a poor manager. The employee should be made fully aware of the expectations of their role. |
| Even more laboratory/experimental set up |
| TIme and project management By switching projects every week, it makes you learn and manage very quickly |
| It was the most important of the lab courses. It was rigorous and painful, but you come out a better engineer. I think it is a key thing that separates us from other students. |
| Summer lab is like a badge of honor, because it turns out that most students haven't had to go through something like it. Not only did it teach us to stay focused and work well in teams to solve problems, it also instilled time management practices and work ethics that weren't required until that point. It made me feel very prepared for work- in fact, my job was a cake walk after summer lab. |

40. Did you take an independent study course – CBE 599?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 11 | 46% |
| 2 | No | |  |  | | --- | --- | |  |  | | 13 | 54% |
|  | Total |  | 24 | 100% |

41. How do you rate the value of your independent study?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Very Valuable | |  |  | | --- | --- | |  |  | | 6 | 55% |
| 2 | Somewhat Valuable | |  |  | | --- | --- | |  |  | | 5 | 45% |
| 3 | Of limited value | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 4 | Not Valuable | |  |  | | --- | --- | |  |  | | 0 | 0% |
|  | Total |  | 11 | 100% |

42. Please explain your rating for your independent study.

|  |
| --- |
| Text Response |
| Working with Brian Pfleger was a great experience. He was an awesome mentor, I am still in communication with him today. The way he set up his lab and the projects he assigned to me really helped me learn a lot about the area of synthetic biology and how to be a good researcher. |
| It allowed me to delve much more deeply into a specific area of chemical engineering and to get my hands on the testing equipment used for the process. |
| Developed independent research and analysis skills |
| I lead the AIChE chemical car team. It was an interesting project but it didn't really lead anywhere. It was an open-ended problem so I got to learn some new things and play around so that was great but nothing great came out of it. |
| Taught 4th graders science. Was a great experience, would do it again if I could (in fact I volunteer with kids all the time now because of that experience). Help with communication and coordination skills (trying to keep 4th graders on task is pretty difficult if you aren't prepared) |
| I worked in a laboratory as an independent study for my last three years of college. Personally, the experience working on an individual research project in a lab was one of the most valuable experiences I had at UW in preparing me for graduate level research. |
| My independent study was huge for my development and my desire to do what I do. Working in the lab helped prepare me for my graduate studies, particularly my understanding of how experiment design and execution worked from an academic standpoint. Since my independent study was in the same field as my current research, I also got a taste of which experiments were particularly effective. I also learned plenty of proper lab technique. |
| The company I worked for did not have the most detailed plan for utilizing their intern. |
| With the time allowed for independent study, it is difficulty to have an in depth experience. |

43. How, if at all, could your independent study been improved?  Be as specific as you can.

|  |
| --- |
| Text Response |
| I think the independent study could be improved by having each student write a report at the end. This formalizes it more. In addition I think a small research symposium at the end would be good (maybe everyone who is doing 599 make a poster and present it). |
| I had a great time with the Dumesic group. If Dumesic had actually cared about me being there and talked to me at least once, it may have been a little better. |
| Maybe for high school students so it was more advanced materials and forced to answer more difficult questions. |
| Possibly, more evaluation of the work accomplished could be done but overall I think my independent study was great. |
| I don't think my independent study could have been improved, but one thing I think might help is to recommend multiple semesters. My first semester doing lab work, I was still learning the ins and outs of the lab. By my second semester, I was basically given a full-blown research project to do with another undergrad. This was a great experience for me, and I recommend that students be told they should consider multiple semesters since I think it will give them a much richer and more complete experience. |
| I was happy to get some experience prior to graduating, however it is difficult to learn much in six months. |
| It could have been improved by having more time to devote to it. I always felt like I would like to become more involved and gain a better understanding, but didn't have the time or energy because of other classes. |

44. In what ways did your independent study experience influence your choice of career?

|  |
| --- |
| Text Response |
| It definitely influenced what I wanted to do in graduate school. I am doing exactly what I want to do now. |
| I was considering going for a PhD in ChE. Thankfully, the 599 helped me realize that I really didn't want to do that. |
| Greatly. My interest in the medical applications of the research led to a career in medicine. |
| no |
| Did not- as I mentioned I do volunteer a lot as a result of that experience |
| Absolutely, my introduction to research at the undergraduate level as well as my ability to work on an individual research project further convinced me that graduate school was the correct path for me. |
| Greatly. In my case, it confirmed my decision to attend graduate school, in that it showed me that I could do the research, analyze the data and present the results. I was a little nervous and hesitant about going for a full-blown PhD, but after my independent study courses, I found that I was able to do it with very little problem. |
| I did/do not want to work in the pulp and paper industry. |
| I would have worked in the field of my independent study if I was able to find a job in the field. |

45. If you went to graduate school, how was your graduate school experience influenced by the independent study?

|  |
| --- |
| Text Response |
| It definitely influenced what I wanted to do in graduate school. I am doing synthetic biology research. |
| Greatly. My interest in the medical applications of the research led to a career in medicine. |
| I was able to apply for better schools and fellowships as a result of the work I did as an undergraduate researcher. It introduced me to many laboratory skills I still use in graduate school and increased my ability to think critically about a problem and design experiments to solve that problem |
| Independent study confirmed that my desire to go to grad school was the correct choice for me by giving me the opportunity to 'live the life', if you will, and learn about what is required to do an independent and original research project. In addition, my relationship with my grad student mentor helped influence this greatly, as I was able to talk freely with him and get a no BS take on grad school. Finally, the ability to work for a world-class professor (Jim Dumesic) has definitely helped my stock and given me a leg up. My experience as a graduate student has been further enhanced by the skills I obtained as an undergraduate researcher, which allowed me to hit the ground running in grad school without having to learn how to do certain techniques. |

46. College Preparation

table of raw scores available

47. Professional Usefulness

table of raw scores available

|  |  |  |
| --- | --- | --- |
| **Level** | **Course Preparation** | **Professional Use** |
| 2 | Very prepared | Frequently used |
| 1 | Adequately prepared | Moderately used |
| 0 | Poorly prepared | Not used |

These scores are coded, and presented in an ‘environmental’ plot to compare level of preparation with professional usefulness. If preparation matches professional use, items would be expected to lie on a 45° line from lower-left quadrant to upper-right quadrant.



All of the non-technical topics have averages for job utility of 1 (Moderately Used) or above, and they also lie above the 45° line. The most heavily used items also have the highest ratings of UW CBE curriculum preparation, showing that the weighting is appropriate.

Communication, Teamwork, and Lifelong Learning are the clear standouts in the survey ratings. Comments below show how alumni understand the importance of these components. Contemporary Issues ranks lowest in both job utility and course content. We will continue to discuss in faculty meetings ways to increase awareness of these in courses, but recognize that the level of emphasis may be appropriately matched with alumni use perceptions already.

The item on “awareness of hazards associated with chemical engineering processes” was added to the ABET Program Criteria in October 2011. This question was added to this section of the alumni survey in winter 2012, and the results show the curricular content relating to process hazard awareness reported by 2007 and 2009 alumni is in line with the other cross-course topics rated here. Hazard awareness preparation is slightly above “adequately prepared” and has a job utility rating intermediate midway between “moderately used” and “frequently used”. This observation will be used to continue strengthening coverage of hazard awareness in coursework and program evaluation.

48. Please comment on any “very prepared” ratings.

|  |
| --- |
| Text Response |
| UW-CBE does a great job of getting people involved in teams and communication skills as well. Mainly in the summer lab. |
| Good communication and team projects - only thing I wasn't prepared for was being a part of a team with low performers - how to deal with that. I work well with other high performers but have trouble with those that just want to do the minimum. |
| I felt very prepared for teamwork and relating with others. Part of this was my involvement in student organizations where I took on leadership roles that required me to interact with all types of students. |
| Lifelong learning is key to working as a professional engineer. I have heard this phrase in the past and I find it true - 'I don't use most of what I learned in college. College teaches you how to learn quickly and when you enter the real world you have to learn a whole new set of skills/concepts using the foundation you received in college.' |
| We were given many situations to work in teams on group projects and in lab classes and were allowed to present our results giving us great experience in working on teams and communication. |
| We did a lot of projects in teams, which of course is vital out in the 'real world.' This, plus reports for those teams has helped to prepare me for my future work, since this kind of thing happens all the time. |
| As I mentioned earlier, I think the program prepares students to continue to learn independently. I also think the focus on writing has prepared to communicate in the workplace. I use my writing skills almost everyday. Clear technical writing is very important for my job. |
| From a technical aspect, I felt very prepared. |
| Frequently covered in course work |

49. Please comment on any “poorly prepared” ratings.

|  |
| --- |
| Text Response |
| Global issues. We didn't really cover this too much. I guess they try to cover this is 1st year engineering, but its hard to understand that when you haven't taken any real engineering classes yet. |
| I feel we didn't have much exposure to real-life industry during CBE. I would find it very interesting to have guest lecturers from someone in a industry field using the material being taught in a class. |
| Not enough focus on written and verbal communications. Including influencing, meetings, and putting together compelling decks/power point presentations to communicate your point of view. |
| There wasn't much focus on communicating effectively in a professional environment. There is a big difference between a lab report and submitting data to your supervisor to explain a problem or justify a solution. We didn't spend much time talking about contemporary issues or how being a chemical engineer can impact the globe. A huge part of my job is around Process Safety Management and making sure we're doing things safely. Nothing like that was presented in any of my courses. |
| Not enough opportunities to work in a group setting. Giving everyone different objectives would have created a more collaborative working environment. |

50. Please comment on any “frequently used” ratings.

|  |
| --- |
| Text Response |
| As a grad student my communication skills have to be good, in addition I have to work in teams collaborating with other grad students and faculty/staff. |
| Communication and teamwork are critical to my job. I work in a "service" roll where I support the needs of a larger team. Working with the team and being able to effectively communicate my results is important to my success. |
| Use it every day at work |
| Teamwork and communication- I do almost nothing on my own |
| No matter where you work, it is likely you will have to be able to function in a team and communicate effectively and I am no different. Additionally, the nature of my work is dangerous if the hazards are not understood and properly engineered for. This is re-enforced daily and I am constantly looking at ways to make processes safer. |
| I have to work with a variety of people from all different backgrounds everyday in order to accomplish solutions; includes being able to effectively communicate with people of different education levels. Being a responsible and ethical person is required to maintain employment. PSM is a huge part of what I do every day. Make sure we make the right decision from a safety perspective. See above "very prepared" for lifelong learning. |
| Communication is one the more essential skills needed to be successful in the workplace and often proves to be a roadblock for some when communicating ideas to people with non-engineering backgrounds. |
| In my position I am constantly required to work in collaboration with other scientists and need to communicate my results in literature settings as well as oral presentations. I am also keeping constantly on top of new results and techniques in my field. In any research field I also think that ethical responsibility should be at the forefront of the researchers mind when designing experiments. |
| Again, as above, I work in teams and write memos, reports, papers, etc. almost all the time, and so this preparation has been crucial for me. In addition, I have worked to design new reactor systems and experiments in grad school, and so I have used the analysis of safety of process equipment frequently. My group also does yearly safety audits, and so we have to analyze our equipment and our lab mates' equipment for potential safety issues. |
| Safety, communication, and lifelong learning are "must haves" for my job and others I have held previously. |

51. Please comment on any “not used” ratings.

|  |
| --- |
| Text Response |
| Not a concern for my profession (impact on global and societal context) |
| Doesn't directly relate to the field I am working in. (global and societal, process hazard) |
| I don't use any unit operations in my research. (process hazard) |

52. Did you participate in a co-op experience?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 10 | 42% |
| 2 | No | |  |  | | --- | --- | |  |  | | 14 | 58% |
|  | Total |  | 24 | 100% |

53. How do you rate the value of your co-op experience?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Very Valuable | |  |  | | --- | --- | |  |  | | 10 | 91% |
| 2 | Somewhat Valuable | |  |  | | --- | --- | |  |  | | 1 | 9% |
| 3 | Of limited value | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 4 | Not Valuable | |  |  | | --- | --- | |  |  | | 0 | 0% |
|  | Total |  | 11 | 100% |

54. How, if at all, could it have been improved?

|  |
| --- |
| Text Response |
| No suggestions. |
| I actually did an internship, but it was the most "real world" experience I got. I think we can help set people up with professionals or companies to foster more internship awareness. |
| None - employer dependant. They just need to have appropriate project list ready when you start |
| My co-op experience was in a diaper plant and thus was not as technical in the chemical engineering field. A more technical co-op may have helped, but I learned invaluable personal skills, teamwork skills, and how to get work done in a professional environment. |
| My co-op terms were great. They helped show how the concepts I learned in class were important and used in a chemical plant. |
| I had a great co-op experience, and really can't think of a way to improve it. |
| It was great- nothing |

55. In what ways did your co-op experience influence your choice of career?

|  |
| --- |
| Text Response |
| Honestly, I don't think at all. It's a matter of what jobs are available at graduation. I had four offers, all in different fields, none of which were similar at all to my co-op. |
| Never even thought of food until I interned at Kraft. Now I couldn't imagine doing anything else. |
| Worked for the company I co-op'ed for |
| I decided I wanted to use the things I learned in school like distillation, heat transfer, and mass transfer. I also wanted to continue working for a big company due to the opportunities to move into other types of work such as optimization and planning and management. |
| I had co-op terms in chemical plants. I found I really enjoyed that type of industrial manufacturing facility and I took a full time position at a refinery because of my co-op experience. |
| It actually gave me a career path. I knew I wanted to do grad school, but my work showed me a field I was really interested in, gave me experience in that field, and showed me that I had some skill in it. It's because of this that I chose my current career path, and I knew that if I wanted the job that I did (working in R and D and running a research group) that I would need to attend grad school. |
| I did/do not want to work in the Pulp and Paper industry. |
| It engaged my interest in Project Engineering through the completion of a project. |
| It reaffirmed that I wanted to be a ChemE. |
| It gave me the opportunity to experience working in a plant and realize that it wasn't for me. It also taught me to appreciate the folks who I do interact with in the plants, and certainly helps me build a relationship with them more quickly than those who didn't have the experience. |

56. If you went to graduate school, in what ways, if any, was your graduate school experience influenced by your co-op experience?

|  |
| --- |
| Text Response |
| The research topic I chose for my PhD study was a result of the work I did as a co-op. My co-op provided me with an interest in kinetics and catalysis, which I continue to work on. |

61. Did you have any international experience during your UW-Madison studies?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 10 | 40% |
| 2 | No | |  |  | | --- | --- | |  |  | | 15 | 60% |
|  | Total |  | 25 | 100% |

62. What type of international experience did you have?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | International Summer Lab | |  |  | | --- | --- | |  |  | | 9 | 90% |
| 2 | Semester Abroad | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 3 | International Internship | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 4 | Other | |  |  | | --- | --- | |  |  | | 1 | 10% |
|  | Total |  | 10 | 100% |

|  |
| --- |
| Other |
| living |

63. How do you rate the value of your international experience?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Very Valuable | |  |  | | --- | --- | |  |  | | 7 | 70% |
| 2 | Somewhat Valuable | |  |  | | --- | --- | |  |  | | 3 | 30% |
| 3 | Of limited value | |  |  | | --- | --- | |  |  | | 0 | 0% |
| 4 | Not Valuable | |  |  | | --- | --- | |  |  | | 0 | 0% |
|  | Total |  | 10 | 100% |

64. Please explain your value rating for your international experience.

|  |
| --- |
| Text Response |
| The ability to spend time abroad and experience new cultures is fantastic. I work with international business units and the ability to understand where they're coming from is greatly enhanced by my time abroad. I would like to see the chem-e program be more friendly to other opportunities to study abroad. |
| Vienna was awesome it was such an amazing trip |
| Spent so much time in the lab that it was hard to take advantage of being in another country. It was great to work with the Spanish professors and the couple weekend trips were educational. I would have enjoyed meeting and working with Spanish ChemE students. |
| I loved being able to go overseas and travel Europe as part of the experience as well. Seeing that chemical engineering in other countries is essentially the same as here made the connection that globally the field is the same. |
| It was great to see how engineering is the same throughout the world. The opportunity to travel and see a new culture is a great benefit as well. |
| I am an international student. |
| I felt like the opportunity to take summer lab abroad was invaluable. It allowed us to have an abroad experience without falling behind in our engineering classes and while earning credit for our degree. It is important to experience other cultures and interact with foreign engineers to understand how their thinking might differ from yours. |
| I enjoyed getting out of Madison and seeing a different culture and having different experiences, however, I don't think that it was particularly necessary or valuable from a career standpoint. I suppose that in the future if I ever need to talk about experience in a foreign country this would help, but I'm not sure that it was extremely valuable for anything other than 'doing something different.' That said, I really enjoyed my international experience. |
| Finally was able to do something interesting and fun during college. The cultural experience was well worth it. Also, you meet some interesting people...some that you'll never forget! |
| It gave me a chance to study internationally and not miss any coursework. It wasn't long enough to assimilate into another culture, but did allow you to get a taste of another culture. It also gave me interesting things to talk about in interviews |

65. Did you participate in any COE activities outside of classes?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 11 | 44% |
| 2 | No | |  |  | | --- | --- | |  |  | | 14 | 56% |
|  | Total |  | 25 | 100% |

66. Please list the activities you participated in and comment on the experience.

|  |
| --- |
| Text Response |
| Engineering sorority - developed leadership abilities far better than anything learned in class. |
| AIChE, ECS activites, Career Fairs |
| Tau beta pi |
| AIChE - was a good experience, learned a lot and met more people from different years |
| AIChE |
| AIChE, NOBE |
| SWE (officer for three years), AIChE (general member) |
| Engineering magazine |
| Polygon Engineering Council, Leadershape |

|  |  |
| --- | --- |
| Statistic | Value |
| Total Responses | 9 |

67. If you did not participate in COE activities outside of classes please explain why not.

|  |
| --- |
| Text Response |
| Too busy with CBE classes and research. |
| I had other activities I participated in. There is only so much time... |
| I chose to participate largely in activities related to the Chemistry department rather than the college of engineering. |
| I had limited time with other extra-curricular activities |
| School/life balance. I spent most of my time outside of class doing homework/studying. I used my "free time" to do other things unrelated to COE. |
| Had to keep up with heavy course load while working 20-25 hours a week to help support educational and living costs. |
| The activities did not engage me. I had a network of social contacts outside of the COE, which kept me occupied. |
| Felt it would distract me from my core classes. |

68. How can the department help facilitate participation in independent study (CBE 599)?

|  |
| --- |
| Text Response |
| Promote it more. Tell students the benefit of doing it. |
| I was not interested in CBE 599 |
| Advertise. Take 15 minutes during one class period to highlight what the topics are for the next semester to try to garner interest. |
| Have professors that are more receptive and engaging to students seeking those opportunities. |
| Perhaps have a posting board online of available positions with research focus so that students have an idea of what opportunities exist. |
| I think more advertising of the opportunity. I did not do my 599 project for the independent study credit and no professor told me the project was eligible for that credit another student told me. |
| Communicate our the available opportunities as often as possible to all CBE students so they are thinking about it early on so when the right opportunity comes they will take it. |
| Make students more aware of how to start independent study opportunities. |
| Reach out to the students more, making them aware of the opportunities available from it. |
| It might have been nice to know what professors were interested in taking on qualified students. |
| Having student testimonials, particularly from graduate students would be a great way. Encouraging the student AIChE chapter to have former UW students in grad school or industry come in and discuss their 599 experience would be great. My 599 experience is a big reason why I am where I am today, and I think that if some of us former students could speak about our passion for it, this would be a great way to get students interested and involved. |
| Not sure. |

69. Did your education provide opportunities to explore entrepreneurship?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 3 | 12% |
| 2 | No | |  |  | | --- | --- | |  |  | | 22 | 88% |
|  | Total |  | 25 | 100% |

74. Is it important for CBE undergraduates to form professional networks?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 23 | 92% |
| 2 | No | |  |  | | --- | --- | |  |  | | 2 | 8% |
|  | Total |  | 25 | 100% |

75. Do you feel you established a professional network with other CBE students during your time in Madison?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Yes | |  |  | | --- | --- | |  |  | | 14 | 56% |
| 2 | No | |  |  | | --- | --- | |  |  | | 11 | 44% |
|  | Total |  | 25 | 100% |

76. How can the department better facilitate professional networks?

|  |
| --- |
| Text Response |
| Have small 1 credit classes with your professor of choice and have topics to discuss. e.g. Brian Pfleger could have a small 1 hr per week class of 5-10 people and we could discuss topics in the field of synthetic biology. Topics could range from current research and companies that are employing CBE. This way we are getting in a room with an expert in the field and in addition we are in a room with peers who have the same interest as us. |
| I think I didn't fully understand the benefits of groups like AIChE when i was in school. This professional network would have been an asset to me. |
| More pizza! |
| Not sure that is not my strength |
| Team projects are more effective than any planned social event |
| Have more alumni-student interactions |
| Encourage students to participate in student organizations more frequently. |
| Team/project work helped facilitate this. I think it was done well. I also became friends with people I had the same classes with over and over so we spent a lot of time doing homework together. I stay in touch with a few people occasionally. |
| Was hard to attend professional network functions such as AIChE with the heavy course load on top of the job I maintained through my years of college to help support my education and living costs. |
| I think the way it's set up in which we work in different teams with different students is really helpful. In addition, I think facilitating 599 sessions with students (how I came to really get to know one of my friends from UW) or having co-ops/internships that have more than 1 UW student at the same job really helps. These 2 things helped me meet a bunch of my really good friends from school who I have relied on for some CBE related things. |
| Advisor should always stress this. |
| I believe the resources are available although there could be more. I was "disengaged" from this process due to my personal choices, which is something I regret. |
| Push the LinkedIn more... |
| Perhaps a cross-department class where engineers with different majors (mechanical, civil, electrical, chemical), work on a large project together? This would allow chemical engineers to make networks with other engineers outside their field? |
| It's really up to the students- you can have as many networking activities as you want, but relationships form organically through course work and extracurricular activities. AIChE seemed to have that effect. |

57. Please give an overall rating about how well your undergraduate education prepared you for your professional career.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Answer | |  |  | | --- | --- | |  |  | | Response | % |
| 1 | Very Good | |  |  | | --- | --- | |  |  | | 15 | 63% |
| 2 | Good | |  |  | | --- | --- | |  |  | | 8 | 33% |
| 3 | Fair | |  |  | | --- | --- | |  |  | | 1 | 4% |
| 4 | Poor | |  |  | | --- | --- | |  |  | | 0 | 0% |
|  | Total |  | 24 | 100% |

58. Why do you rate it this way?  Be as specific as possible.

|  |
| --- |
| Text Response |
| CBE was really good at preparing me for my career. Classes were useful and I really developed my communication skills. |
| Academic rigor paired with laboratory experience. |
| I was able to get a job easily, able to transfer to another job easily, and felt prepared to tackle new challenges. |
| Education/knowledge was good or very good. However the communication, leadership, and soft skills were not nearly as developed as they could be, so I almost rated this fair. |
| It is a difficult course load, but it prepares you for the work ethic you will need in the real world. It is competitive out there, and the more stress you can manage through, the more it will set you apart. |
| I was able to hit the ground running from day one using what I learned in my coursework as a foundation for learning how to do my job |
| Strong technical skills and good communication skills |
| The knowledge gained in my undergraduate career is directly used in my graduate school career and my professional career |
| I had a great experience with AIChE because I was able to develop very good relationships and meet many students I otherwise would not have had the chance to meet. |
| My education gave me a good technical basis for a lot of the things I do while working in a refinery, unit ops specifically. It also taught me how to learn new concepts quickly. |
| Didn't feel like I got a personalized education, was more of just another number in the system. |
| I think I received a well-rounded and complete education in engineering. |
| I think the coursework and curriculum at UW was excellent preparation, and really all my experiences there have really helped me to plan out my career path. As I go through, the theoretical and background knowledge that I gained in my classes has supplemented nicely with my practical experience (co-op, 599, etc.) to give me a good basis of skills for my current graduate studies and future work. |
| It offered an excellent foundation to be applied to a specific Process Engineering role. |

59. Please add any comments you feel would be helpful in improving our undergraduate program:

|  |
| --- |
| Text Response |
| Keep up the awesome work! |
| I'd push harder to encourage co-ops, internships, and undergraduate research. |
| Survey was a little too long, your answers will not be as helpful from the latter parts of the survey because it will wear people out. |
| It's a good program - demanding but it helped me get a good education that has allowed me to do a lot of really cool things both in school and since I've graduated. |
| Once again, I mentioned some kind of 'industrially relevant' course, maybe a survey of 'practical chemical processes' that a graduate might see in their working lives may be helpful or perhaps just interesting. At Purdue, they also have a 'safety' class that could be an interesting course to incorporate, preparing students for safety regulations in industry. |
| There are some areas where things could stand to be updated. Process Control, while informative, does not connect especially well with today's common control systems. |

60. What type of experiences would you have liked to have but did not receive?

|  |
| --- |
| Text Response |
| Internship. |
| I think more exposure to industry in the classroom would have been great. At my previous job I was a manager so more exposure to management training or general business training would have been an asset. I think more experience with project finances would also have helped. |
| More sleep. |
| More hands on experiences with project management. |
| A semester where I did not have lots of homework and had a lot more free time to enjoy college |
| None |
| Nothing I can really think of off the top of my head. |
| More "real world" projects. More opportunities to understand how the coursework can be applied in a career. |