Lafayette Engineering Timeline

Research Question

Since Lafayette’s founding in 1824, the curriculum and majors provided by the school have been constantly evolving to reflect the desired skill set of the students and society. In the spirit of EGRS 451, our research project is an attempt to answer “how has the engineering department at Lafayette College evolved since its founding and how has this evolution been representative of larger education trends.” To do this we worked with Skillman special collection staff in an attempt to answer this question.

There have been many different engineering departments that have come and gone at Lafayette College, but for this project we focused primarily on departments that yield graduating majors; not minors, or other engineering programs, like graphics or mechanics. According to Pennsylvania Historian James F. Young, “Educating the whole man, not just the engineer” has been the premise of Lafayette’s Engineering Program since its founding and our project has been an attempt to demonstrate the diverse opportunities that have been available to an engineer at an elite liberal arts school (Schaffer, 1979).

Background Context

During our investigation we have compiled a significant amount of data on the specific timeline of Lafayette College’s engineering majors. Although not all of this information is found in our final visual prezi, we have attached much of our additional research in timeline format in Appendix B. Appendix B is subdivided into two main sections. The first section is a general timeline that outlines key events specifically related to only Lafayette College’s majors. The second section is based on individual timelines broken down for each of the 10 engineering majors which are, Administrative, Industrial, Engineering Studies, Civil and Environmental, Electrical and Computer, Physics, Mechanical, Chemical, Mining, and Metallurgical. In the section devoted to each major we have included a background, which ties the evolution of the specific engineering program at Lafayette to the greater needs of society and as an attempt to give insight why that specific major evolved at that specific time.

While by no means comprehensive, these paragraphs will be included in our final presentation in an attempt to show some of the thought that went into this project. In addition our annotated bibliography (Appendix A) contains many useful sources that give further background evidence of how Lafayette’s engineering department fits into a larger field of study.

A sample paragraph that discusses the evolution of the Engineering Studies Major is included here:

*The Engineering Studies Department came into being out of the ashes of the Industrial Engineering Program. A liberal arts-engineering subcommittee of the 1969 Curriculum*
Committee first offered the recommendation for an A.B degree in engineering. One of the committee members was quoted as saying “our present society, and more so our future cultural environment, calls for people educated under a redefined liberal education which recognizes the many technical complexities of the 20th century living.” (83). This major was also representative of general trends in recognizing current limitations in engineering education in the 1960’s where society was demanding a response to “what they saw as an overemphasis on scientific training and a consequent loss of professional identity (Wiskioskik, 2009).

METHODS

This project was done in series of steps. The first was to do extensive research into specific dates related to the start and stop of Engineering disciplines at Lafayette College. Skillman’s special collection staff was key in providing the necessary resources. Most of the information used towards the development of the timeline was obtained from articles, books, and course catalogues found within the collections. Many of these resources also have begun to be digitized and that allows for remote access, a process who should be encouraged.

The next step of this project was focused on how we can relate Lafayette’s Engineering Department to the larger scholarly context of engineering education through the country. This proved to be much more difficult. We focused on material that was specifically related to each major and we have found that there is often a story about the evolution of each program. Some of these majors were more easy to compile information, (mining engineer), while others were more obscure (administrative engineering.) Interestingly, in all cases we found connections to events and ideals that extend far beyond the reach of Lafayette College. To do this we researched historic events that related to the different disciplines in the years around which they were formed. From there we then decided the best way to present this information graphically was to create a prezi presentation that was dynamic and displayed a large subset of information which included a background paragraph on each major. This information is also included in the above timeline breakdown based on each major.

CONCLUSIONS AND OUTCOMES

Our conclusions are slightly different then other groups. We have provided a timeline that has attempted to address our research question, but this is an open ended set of information and we recognize that more could always be added. In the end this project will be provided to the Special Collections staff at Skillman Library for additional reference along with a CD containing our PowerPoint/ prezi presentation and slides on the different majors. Special collection staffer, Diane Shaw specifically, has mentioned on more than one occasion that there is the potential for this project to be source material for the 150-year anniversary of the Lafayette Engineering department, which will occur in 2016.

Our prezi presentation is designed to be a stand-alone reference and timeline on the history of Lafayette Engineering. The prezi is a dynamic tool, which allows the user to either follow a preprogrammed path that guides the reader through all the majors or allows the user to pick which specific major they would like to further investigate. The prezi also contains information about the location of this memo, which will allow the appendixes to be referenced in the future.
RECOMMENDED NEXT STEPS

Now that we have compiled our research into a usable format for future classes, we don’t want this project to stop. It is our belief that we have provided a basis for an outline of all the different majors at Lafayette College. Given additional time we would have liked to include all Engineering minors as well, but that could be part of a project for a future student. One possible subset of additional information that we hope future students could compile is statistics on periodic graduating classes, say every five or ten years that would breakdown statistics on each major. Such statistics could include the percentage that attended graduate school versus those who went straight into the workforce. The student could also work with the administration to compile information regarding starting salaries by major from a historic perspective. It may even be possible for students to draw a link between strength of the economy and hire ability of students by major.

Another possible addition to this project could be to add details related to the specific professors that were around during different time periods of Lafayette College. This could give credit to specific individuals who were actually responsible for the evolution of certain programs. For instance in regards to Engineering Physics we referenced a man named Professor Gordon who was solely responsible for the creation of the major. We believe it would be a worthwhile addition to give a greater understanding of the personal motivations of the specific individuals who created these majors for historic posterity. Now that this project has provided the basis and conceptual dates an outline, a more humanistic approach to this same topic might seem beneficial in humanizing the history of the engineering.

APPENDICES

Appendix A: Annotated Bibliography.

Appendix B: TimeLine of All Engineering Programs

Project can be found: http://prezi.com/kxrdq2ssrhwq/present/?auth_key=u8byz4y&follow=4ccyb_pz8re2
Appendix A
Lauren Phillips and Zachary Roberts
April 6, 2012
EGRS 451
Professor Cohen

Work Cited:
   This article links engineering education to the development of women education and social equality. As part of a larger debate of the evolution of engineering education, the role of women needs to be specifically addressed because they faced sexist opposition in their entry into this field. Even today women play a smaller role in science and technology studies and this article elaborates on this view. Lafayette fits into this model because of its emphasis on equality and 1970’s integration of gender in the college.

   This primary source document is dedicated to analyzing the Lafayette College curriculum as of 1976. It discusses and justifies the various options for possible course changes in the future at Lafayette College specifically. This source’s largest limitation is the publication date does not correspond directly with any stop/start dates of any of the engineering major, but it is still a good reference as for the method in which curriculum designers would approach the creation of department requirements. This will help contribute to the timeline and show how the Engineering department began to evolve to what it is today.

   Lafayette College Course Catalog. http://catalog.lafayette.edu/4832.htm (Online Addition). This link is through the Lafayette College Special Collections’ link at the Lafayette College Library Website, and is only for approximately the last 20 years.
   The above Catalogues at Lafayette College state the current courses offered during the selected years. In certain years it also provides descriptions of the Majors. This is important because these catalogs demonstrate the evolution of the majors themselves both in terms of requirements and context. In some cases it is possible to compare and contrast descriptions of the different majors and how they changed over time. These are examples of primary source documentation. These are limited because they only show class curriculum not a larger picture of the engineer at the time and they were not designed originally for cross time comparisons.

   This article gives an overview of the greater cultural context regarding the creation of mining engineering as a profession throughout the United States, and we are able to create our own link from this article to the Lafayette Major and its rise and eventual fall. This is a scholarly peer reviewed article that is of limited overall usefulness, but has key details that strengthen our specific connection to the greater scholarly investigation of
This article gives specific information about mining engineering between 1850 and WW1 and the evolution from on-the-job training to formal education.

   
   This article serves as a scholarly source that outlines the history of the engineering education field. This is both a critique and a history. The article compares the evolution of the modern engineer to that of other engineering societies, including the Incas, and challenges the reader to question how sustainable our practices have actually become. This article is useful because it serves as a connection between Lafayette’s engineering program and the development of a larger field of scholarly work that investigates overall engineering education process.

   
   This is a source that provides a historical context of the Chemical Engineering Majors’ development by discussing the evolution of the American Institute of Chemical Engineers and its influence on institutions. While Lafayette is not referenced by name, this is from a peer-reviewed journal and the information within it provides more of a connection to the larger scholarly work related to the history of engineering education. This article specifically gives background information on the role of the American Institute of Chemical Engineers and the growth of the profession.

   
   This article summarizes what is essential in the engineering curriculum. It argues that changes and improvements are necessary for the current engineering programs in order to stay in line with the constant technological advances. In addition, it focuses on how important hands on experience is for engineers to succeed past college. Conclusions from this article can be applied to validate the changes in engineering education at Lafayette College.

   
   This paper focuses on address the needs of the engineering student and how the evolution of the engineer should progress up through 2020. This article places the engineer in a global context and identifies trends in the history of engineering history of education. This report is highly respected and cited in the academic field and will serve as a strong base for our report.

   
   This website is for the current Engineering Studies department. It is devoted to outlining the course curriculum for prospective students as well as current students. In addition, it lists the current faculty and various recent achievements. This is a public relations source and should be considered as nothing more, although it is an example of how Lafayette, as a school, showcases this major in comparison to the BS engineering majors. This could then be expanded for all the engineering majors. This could also be a source of visual reference in our final graphic display of the timeline.

This is a primary source document, which includes information on the AB/BS 5-year program in Engineering and International Studies which was passed at a Curriculum Committee meeting April 4, 1995. Confirmation of this date will be used towards the development of the timeline. In addition, the program description will help make further conclusions as to the reasoning behind the program.

   This serves as an external analysis of Lafayette College. This book is very detailed and outlines the history of Lafayette in the form of a biography instead of a pure outline of events. This focuses on the late 1920’s through the late 1970’s and was used to help piece together the history of the college. This is a peer-reviewed source.

   This article provides an introduction to early scientific courses of study at Lafayette College. It also introduces a larger scholarly debate on the reasons why Lafayette College chooses to start their engineering programs at this time. Quotes from this article could be used in the final project. This is an interesting find because it is part of the larger history of Pennsylvania and it interesting how religion played such a large role in the initial founding of Lafayette College and for a significant time thereafter.

   This is an illustrated version of the history of the engineering education in the United States and Canada. It will be useful for our project because it also provides an in depth commentary on the evolution of engineering. There is also a small reverence to Lafayette College on page 46, which addresses both Lafayette and Lehigh. Some of these pictures could theoretically be added to a timeline product. This however is limited overall in its relative connection to Lafayette.

   This is an article on the geographic influence of engineering education in the United States, compared to Europe and Canada. Geography plays a huge part on how the engineer is trained and this source develops this idea much further. The article also makes the connection between engineering and socio-economic indicators associated with the level of education attainable because of the financial resources of the area in which the schooling occurred.

   The Map As Art displays 350 map related artistic visions by various well-known artists. Each map displays information in a new form of creativity, whether it be in color, shapes, or designs. Different maps in these books could help provide ideas on how to creatively present the evolution of engineering development at Lafayette College. By using a map, the evolution per major as well as per decade could be portrayed uniquely. This like our other source on graphic design is necessary because, while we may not use the methods shown directly, the use of this information for brainstorming needs to be cited.

The Lafayette Alumnus contains articles on the history of Engineering showing the precursor for why Engineering Studies developed. In addition, it analyzes where the department needs improvement to help strengthen it for the future. This issue discusses the issue of whether a school the size of Lafayette can handle six engineering degrees. This is a great primary source for a historical context at Lafayette.

   This article attempts to address the needs of Lafayette’s engineering curriculum. An engineering curriculum must be developed in order to prepare a graduate for any situation one might encounter in the next 40 to 50 years as working. As a result, a plan for the future in the program is discussed as well as future problems that could occur. This could serve as another article which addresses historical context. It is from the wake of this era that the AB engineering program is born and we can address that in our final presentation.

   This issue shows the trending increase of engineers as the student population increases and time passes. This is then used to analyze how to strengthen the engineering program for the future and increase enrollment in the department. In addition it also addresses the importance that engineering students enroll in humanities as well as economics courses. This is another primary source document that would give a relative snapshot into how the Alumni community viewed the engineer and how Lafayette’s liberal arts majors were increasing in popularity. The greater significance of this article though is extremely limited.

   There cannot be a complete analysis of the engineering profession without looking at the role of women. This book looks the professional lives of women engineers back to the 1920s. This goes through and examines equality and brings the analysis into the 21st century. They found that while much has changed, there is still a lot of progress to be made. This would be a source of women serving in the role of the engineer. While this does not directly relate to Lafayette engineering history, this source is an example of our attempt to broaden our research and connect it to a larger investigation of engineering education and the impact of women entering the workforce. When women started attending Lafayette in 1970’s they become part the larger target group on which this book is focuses.

   A pamphlet demonstrating the propaganda for why students practice engineering at Lafayette. This had interesting visual art that could be incorporated into a final product, but does not serve much of an additional purpose. The visuals presented on this pamphlet could be used in a final graphic representation. It is included because of its use as a primary source on which information can be used in the timeline.

   This book supplies a variety of different methods for visualizing and generating unique and creative manners of communicating knowledge. In terms of this project, the book could possibly lead to unique inspiration of how engineering and the visual arts could be connected. The book highlights several interesting mapping techniques that highlight the
connection between different concepts to create intricate knowledge webs. These webs could be used extensively in our project.


This article gives an overview of the greater cultural context regarding the creation of mining engineering as a profession throughout the United States, and we are able to create our own link from this article to the Lafayette Major and its rise and eventual fall. This article is of limited overall usefulness, but has key details that strengthen our specific connection to the greater scholarly investigation of engineering education.


This study at Massachusetts Institute of Technology analyzes the past graduates career path. It was shown that a very high percentage of graduates, specializing in engineering, eventually end up in executive positions in business. The reasoning behind the chosen career choice is generally because the demand for managerial personnel with engineering skills. The study can be connected to Lafayette College’s Engineering Studies major. This major provides the students with management and business skills as well as science and engineering background. As a result, as shown by the trends found in the MIT study, graduates are extremely prepared to succeed in highly demanded executive positions.


This book outlines the development of the engineer in the last two centuries. This could be used as contextual support for our research project. The chapters titled The Engineer in 20th Century America and The Engineer in 19th Century America provide information that could be used as part of a reference to a larger scholarly debate.


This book provides a graphic representation of time in Europe and the United States from 1450 to the present time. Time lines are presented here in various ways, all providing new ideas for how we can present the timeline on engineering education at Lafayette. Although the information in the book is not all relevant, it will help inspire us to develop our own ideas and methods of presentation.


This book discusses the development of Engineering from 1752-1976 in Northampton County, PA. A portion of the book is devoted to analyzing engineering development at Lafayette College. It thoroughly describes the different disciplines showing how they evolved. Many key dates discussed in this book will be important when developing the timeline. Unfortunately, majority of the content within this book was written shortly before the Engineering Studies department was founded. However, the background it does provide helps show the groundwork that was set prior to developing the Bachelor of Arts degree. There is also extensive history for the other older majors that are contained within this source. This is the most important source used in this project for attaining background knowledge.

This source is often referenced in several scholarly articles as a source of historical background for why the 4 year engineering program has struggled at so many schools since the 1800’s. It found that there is simply too much information that students have to learn in too condensed a time period. Because of this some of the liberal arts education curriculum must be sacrificed. This article also investigates the Society for History and Technology.


As the title suggests, this book focuses on the development of equality in the engineering profession. The book goes into the racial implications from a historical context, which great detail placed on the post WWII era. While this book might be too broad this timeline, the information still provides a strong historical and cultural context from which to place Lafayette at comparative time periods. This book does address engineering education in the context of racial prejudice. A complete historical context would include this information.


This is a Lafayette published pamphlet, which goes into considerable history on the electrical engineering education at Lafayette College. It will be used like the course catalogs, as a primary source for details concerning specific dates of activities that occurred within the majors.


This book contains a significant amount of timelines which would be helpful when deciding on the various presentation options. As shown, timelines have the option to be presented as a list or a chart, separated by different categories or time periods. When working on the final presentation, it is essential that the information is portrayed in both a creative yet informational way. This is a source that may be of limited usefulness, but it is important because it demonstrates our overall attempt to research as many different types of graphic representation models as possible.


This source is an in class chapter from a book that Dr. Wisnioski is writing. Dr. Wisnioski came to Lafayette and presented on this material. It outlines the “liberalization” of the engineer, specifically in the 1960’s and the public backlash to pure engineering. His work also connects and emphasizes liberal arts education becoming part of a staple of engineering education. He focuses on making connections between this liberalization and its demand at prominent Engineering and science and technology schools throughout the country.


This is a paper written by Dr. Wisnioski, which critiques Engineering education in the 1960’s. This provides a history and context of liberal education in engineering education
as well as a commentary on how it has failed and it questions the role of the engineer and technology in society. This also gives specific evidence from case study examples of how events occurred at schools such as Caltech, UCLA.

Appendix B

Timeline of All Engineering Programs

note: all information in this section is from Two Hundred Years of Life in Schaffer, Norman G., Alfred Pierce, and Samuel. Two Hundred Years of Life in Northampton Country, PA. Easton: Northampton Country Bicentennial Commission, 1976. (unless stated otherwise)

1824- “At White’s Hotel in Easton the twenty-seventh of December, 1824 a group of public-spirited citizens resolved to establish a college at the Forks of the Delaware.” This was the start of Lafayette College. (Course Catalog 1938, 21)
1825 - Civil Engineering First mentioned, but never implemented and abandoned in 1832 (29)
1826- Charter for college granted by state legislature (Course Catalog 1938, 21)
1837- Basic mining course begin to be taught (35)
1841-1842 note* in Civil Engineering
1841-1851 Engineering Courses were offered for seniors. Might have included topographical drawing and mechanical arts (29)
1862- Passage of Morrill Act. This offered states substantial grants to federal lands to subsidize creation of college- level programs for “agriculture and the mechanic arts”. (Reynolds, page 21)
1865- Start of Engineering as a Science at Lafayette - Degree in Engineering, Chemical, Mining
1866- Civil engineering classes become part of curriculum (29)
1866- Establishment of Lafayette mining curriculum (36)
1869- First B.S. given in Engineering Physics program (was abolished in 1949)
1871- First degrees in BS (Civil Engineering) (35)
1872- 5 B.S. Engineering Degrees 3 in mining, 2 in civil engineering (16)
1873- Pardee dedicated. Assigned Mining department in building (36)
1889- Start of Electrical Engineering Program at Lafayette College (38)
1890 Pardee Burned and Rebuilt
1899- Creation of Mechanical Engineering Dept because $100,000 Andrew Carnegie 75 year Endowment pledge if college could raise another $600,000
1902- Old South College renovated and a laboratory was installed for the mining engineering department (18)
1909 Old South College was renovated again and got an engineering lab.
1910- Mechanical and Electrical Engineering courses had been added (46)
1916- Chemical Engineer courses were taught (57)
1919- To get an engineering degree you needed 3 years practical experience and then a thesis
1919- Chemical Engineering’s first graduates (59)
1922- Society for the Promotion of Engineering Education (American Society for Engineering Education) funded a ten year study. This led to the improvement of engineering curricula all over the country.
1922-23- Administrative Engineering was introduced to Lafayette (52)
1929- John Market Hall of Mining Engineering (Dedicated)
1936- Engineering Physics developed under Clarence McCheyne Gordon (57)
1937- Metallurgical Studies- Degree program (64)
1937- Lafayette College engineering curricula accredited by Engineers’ Council of Professional Development (ECPD).
1938- Chemical Engineering was established (57)
1946- The department of Mechanics was formed with William G. McLean as its head (76)
1950- Engineering Physics ended (57)
1952- Study funded by Ford Foundation Grant for Advancement of Education. (25)
1954- Alumni Hall of Engineering- completed and initially housed all engineering disciplines except metallurgical (25)
1954- Administrative Engineering was changed to Industrial Engineering (55)
1956- Metallurgical Engineering was established at Lafayette (63)
1957- End of the Mining Engineering Program, but Markle remained to serve geology department (38)
1959- Markel converted into administration building (38)
1963- Graphics was eliminated as a separate course and became part of the fundamentals of engineering course (72)
1966- Metallurgical Engineering housed in Markle Hall until this time. (25)
1963- Metallurgical department joined with other engineering departments in common first 2 years of study (69)
1970- Women entered Lafayette College
1970- Start of the Engineering Studies, then called BACHELOR OF ARTS IN ENGINEERING major with recommendation of Liberal Arts- Engineering Subcommittee and Engineering Council. (83)
1972- All engineering curricula were reduced to a 36 course program (88).
1972- No major is offered in Industrial Engineering, effective with the Class of 1972 (Course Catalog 1969, 180)
1989-1990 Last time Metallurgical Engineering was referenced in the Course Catalog (Course Catalog 1989)
1993-1994 Name Change of Civil Engineering to CIVIL AND ENVIRONMENTAL ENGINEERING (Course Catalog 1993, 59)
1993- Introduction of the common course of study (Course Catalog 1996, 8)
1995- Option of a B.S. dual degree in one of the Engineering majors and International Studies approved by the Curriculum Committee (Curriculum Committee Motion)
1996- Introduction of 5 Year Dual Degree Program
1999 - Name change to ELECTRICAL AND COMPUTER ENGINEERING
2003- Biotechnology/Bioengineering minor became available
2008- Name Change of Liberal Arts Engineering Degree to Engineering Studies in the Card Catalog (Course Catalog 2008, 111)
**Engineering Majors**

**Civil Engineering**
1825 - Civil Engineering first mentioned, but never implemented and abandoned in 1832 (29)
1841-1842 note*
1852- Founding of the ASCE
1866- Civil engineering classes became part of curriculum (29)
1871 First degrees in BS (Civil Engineering) (35)
1879- Graduates of the Engineering Course receive the degree of Civil Engineer (Course Catalog 1879, 34)
1993-1994 Name of major changed to CIVIL AND ENVIRONMENTAL ENGINEERING

*(Gendebien, 1966) “The 1841-1842 catalog carries the mysterious addition of a one-semester offering in “Civil Engineering,” replaced in 1845-1846 by, simply, “Engineering.” In 1851-1852 the offering disappeared as mysterious as it had appeared a decade earlier.” (135)

Paragraph: Although Lafayette first investigated Civil Engineering in the 1840’s it was not until 1866 that Lafayette first introduced the BS Major to the campus (29). Lafayette was following the examples set at West Point and RPI and was just one year behind MIT in instituting engineering majors. “This pattern of divorce of technical and scientific from classical persisted in the decades after the Civil War, except at Lafayette.” (Gendebien, 1966. pg 128). In the Lehigh Valley Demand for Civil Engineers also increased dramatically in 1873 with the founding of Bethlehem Iron Company. Lafayette’s Civil and Mining majors came from a demand to “set the goal of educating not just the engineer, but the ‘whole man’ who is able to meet the challenges of a world in which, scientific, technological and human needs have steadily become more complex”(34).

**Electrical Engineering**
1889- Start of Electrical Engineering Program at Lafayette College (38)
1910- Mechanical and Electrical Engineering courses had been added (46) 1909 Old South College was renovated and got an engineering lab.
1998 - “Electrical engineers, like all engineers, are problem-solvers. They plan and direct the design and testing of electrical equipment, and they conduct valuable research. Work in electrical engineering includes power generation and distribution, communications, computers, and manufacturing. The curriculum builds on the fundamentals in the physical and engineering sciences as well as mathematics and computer science. More than 20 percent of the program may include social sciences and humanities courses. Well-planned, hands-on electrical engineering design experiences are woven into the curriculum. Facilities include digital circuits, control systems, and electronics and signal processing laboratories. Juniors and seniors are encouraged to do so do independent study and research projects.” (Course Catalog 1996, pg 90)

1999 - Name change to ELECTRICAL AND COMPUTER ENGINEERING in course catalog
1999- Definition: “Electrical and computer engineers, like all engineers, are problem-solvers. They plan and direct the design and development of electrical, electronic, electromechanical, and computing equipment. In addition, they apply computers as design tools, communications systems, and research resources. Careers in electrical and computer engineering are widely
varied and include electronics design, communications, computing, manufacturing, electric power generation and distribution, consulting, and research.

The curriculum builds on the fundamentals in the physical and engineering sciences as well as mathematics and computer science. More than 20 percent of the program may include social sciences and humanities courses. Well planned, hands-on engineering design experiences are woven into the curriculum. Facilities include computer systems, control systems, microelectronics, photonics, and signal processing laboratories. Juniors and seniors are encouraged to undertake independent study and research projects.” (Course Catalog 1999, page 95).

2009: Definition: “Electrical and computer engineers, like all engineers, are problem-solvers. They plan and direct the design and development of electrical, electronic, electromechanical, and computing equipment. In addition, they apply computers as design tools, control systems, communications systems, and research resources. Careers in electrical and computer engineering are widely varied and include electronics design, communications, computing, manufacturing, wireless systems, electric power generation and distribution, consulting, and research. The curriculum builds on the fundamentals in the physical and engineering sciences as well as mathematics and computer science. More than 20 percent of the program may include social sciences and humanities courses. Well-planned, hands-on engineering design experiences are woven into the curriculum. Facilities include computer systems, control systems, microelectronics, photonics, microwaves, VLSI and signal processing laboratories. Juniors and seniors are encouraged to undertake independent study and research projects.” (2009 Course Catalog, page 107).

Paragraph: Electrical Engineering at Lafayette College came in the wake of Edison and Faraday’s advancements in electromagnetic technology and induction telegraphy being used in the Lehigh Valley. The courses in electrical engineering at Lafayette were initially part of the Physics department and remained so until the major became part of the engineering department in 1909 (Smith, 1976). By the 1950’s Lafayette had started working closely with a student branch of the Institute of Electrical and Electronics Engineers, which demonstrated Lafayette’s acceptance by larger professional industry in this field. The major continued to evolve over time and eventually began to incorporate newer technology and computer science in the 1990’s.

Mechanical Engineering
1899- Creation of Mechanical Engineering Dept because $100,000 Andrew Carnegie 75 year Endowment pledge if college could raise another 600,000
1910- Mechanical and Electrical Engineering courses had been added (46)
1909 Old South College was renovated and got an engineering lab.
1910- Definition by Professor Ross. “ The work in the shops is intended to render the student familiar with modern shop practice and competent to judge of the quality of machine work, and to enable him in his drawing work to so arrange his design that castings, forgings, and machine work may be done in the most economical manner.” (Course catalog 1910)

2009- Definition “Like all engineers, mechanical engineers are problem solvers. They design, develop, and construct internal combustion engines, machinery, power plants, transportation vehicles, and biomedical devices. They work in manufacturing, marketing, management,
research, education, and system design and development. The department offers a comprehensive program that prepares students for professional work or further study. The curriculum includes a solid grounding in mathematics, science, and technology, along with electives in the humanities and social sciences. Design, a central component of mechanical engineering, is integrated throughout the curriculum. Students use contemporary engineering computer software and apply modern manufacturing processes in creating and constructing their design projects. Facilities include laboratories for modern manufacturing designs, internal combustion engines, thermo-fluids, controls, instrumentation, precision measurement, and materials. All majors do a year-long senior design project. Seniors may elect to do independent study or honors thesis research.” (Course Catalog 2009, page 114).

Paragraph: The interest in mechanical engineering rose post-Civil War period (from about 1880 to the turn of the century). Mechanical engineering worked to establish pure scientific research, replacing the older scientific methods practiced and the professional society (ASME) found origins going back to the 1880’s. Education was changing and the nation’s high schools and higher institutions were adapting to these new teaching methods. Interestingly when Mechanical Engineering was introduced at Lafayette, few students or members of the public knew what mechanical engineering was when it first came to Lafayette College. It was still the “era of the steam engine and the first Model T Ford, the Wright Brothers’ glider and the first practical marine diesel engine.” It was these novelties that would change the world causing Lafayette’s staff to realize mechanical engineering would be essential to the 20th century (47).

Engineering Physics
1936- Engineering Physics developed under Clarence McCheyne Gordon (57)
1950- Engineering Physics ended and became its own major with a separate department (57)

*1936- “This course , leading to the degree of Bachelor of Science in Engineering Physics, is the outgrowth of the recent rapid development of the subject matter of physics. This advance has led to the demand for college graduates who have special training in physics and in the perfecting of new instruments and methods for the testing of the properties of matter and its behavior under various conditions, both on the part of the industries as well as other sciences including chemistry, biology, medicine and geology.” (1938 course catalog, 80)

Paragraph: Engineering Physics at Lafayette College was an interesting short-lived experiment that came from the mind of Clarance McCheyne Gordon, who was a Physics professor at Lafayette from 1909 until his retirement in 1948. Although the degree dissolved after his retirement, it served as a unifying link between engineering and physics at Lafayette College that arguably exists even today. (57).

Chemical Engineering
1908- American Institute of Chemical Engineers (AIchE) was founded (Cohen, 1996).
1916- Chemical Engineer Courses were taught and established by Professor Edward Hart (57)
After Dr. Hart retired the program struggled (60)
1919- Chemical Engineering’s first graduates (59)
1938- Establishment of Chemical Engineering by Dr. Elliot L. McMillen (57)
   The early Chemical Engineering curriculum involved no new courses but a
   reapportioning of existing courses (59). In 1938 it was finally established as a separate
   department headed by Dr. Elliot L. McMillen. (60)
1938- Course catalog definition “The Chemical Engineer is one skilled in the design,
   construction, and operation of industrial plants in which matter undergoes change of physical and
   chemical nature. In effecting these changes the Chemical Engineer employs a variety of unit
   operations, such as: distillation, evaporation and drying, and unit process of organic industrial
   chemistry: nitration, sulphonation and diazotization. His education is based upon the twin
   foundation of sound training in the major branches of chemistry and in the basic engineering
   studies of mathematics, physics and mechanics. In addition to design, construction, and operation
   of chemical plants the Chemical Engineer may engage in research, process development,
   technical service, sales engineering, and consulting practice.” (Course Catalog 1938, 79)

The Early History of Chemical Engineering:
1908- American Institute of Chemical Engineers (AIChE) was founded—years following the
   growth of Chemical Engineering was rapid
1910s- Concept of ‘unit operations’ contributed to defining university curricula for chemical
   engineering
1920s- ‘Unit Operations’ influenced professional institutions (Cohen, 1996).

Paragraph: Prior to WWI, the chemical revolution and rise in science was occurring in Germany
   causing a need for large-scale chemical facilities and a spread in chemical engineering. The story
   of Chemical Engineering at Lafayette College is not a simple one. During WWI, a Dr. Hart
   recognized the need for Chemical Engineers in America and he connected the chemistry
   department and other engineering courses. It was not until 1916 that Lafayette produced its first
   chemical engineers and 1920 before graduating Chemical Engineers received their B.S. When Dr.
   Hart retired in 1924 the chemical engineering curriculum declined and graduates were “poorly
   prepared in basic chemical engineer.” The establishment of AIChE had helped to set industry
   standards, and although Lafayette in the late 1920’s had recognized some of those failures, the
   lack of funds during the Great Depression did not allow for a revamp of the major until 1938
   when a chemical engineering curriculum and department were established (61).

Mining Engineering
1849- California Gold Rush (Ochs, 1992)
1859- Colorado Gold Rush (Ochs, 1992)
1866- Establishment of Lafayette mining curriculum (36)
1872- 5 B.S. Engineering Degrees 3 in mining, 2 in Civil engineering (Two-hundred) (16)
1957- End of the Mining Engineering Program, but Markle remained to serve geology
   department (38)
   *
*1938- mining and metallurgy engineering were linked and remained part of the mining
   engineering program. (67)

Extra Notes
The Rise of Mining Engineering
1849- California Gold Rush
1859- Colorado Gold Rush
During the rushes (e.g., 1849 in California, 1859 in Colorado), untrained miners applied relatively simple, inexpensive techniques. In the early consolidation stage, apprenticeship-trained miners, chiefly from Europe, used more capital-intensive technologies (roughly mid-1850s in California, 1870s to 1880s in Colorado). During the first wave of industrialization (1880s/1890s to 1930s), college-educated mining engineers gradually took over control of production, automated tools were introduced, and business organization began to change. Finally, after World War II, mining engineers became established, automated mining systems became more common, and a more complex corporate system-Chandler's managerial capitalism-emerged. (Ochs, 1992)

Pioneer Western Mining Engineering
After 1850, on-the-job trained mining engineers were gradually replaced by formally educated mining engineers.
In the years between 1850 and World War I, advancing technology made sweeping changes in the mineral West. (Clayton, 1980)

Card Catalog Definition: “The Degree of Engineer of Mines, is to provide in a through manner a good foundation for professional work in Mining, Engineering, Chemistry, Metallurgy, Assaying, and Geology” (Course Catalog 1897, 76).

Paragraph: In the 1860’s coal and ore seemed to be in seemingly endless supply and the demand for trained individuals helped to spur interest at Lafayette. With the separation, concentration and reduction of ores to metallic states, it became clear that the knowledge of chemistry, physics and mineralogy was needed and so Lafayette started its mining program (23).

Interestingly, both Lafayette’s Mining and Civil Engineering programs evolved as a way to get out of taking Greek or Latin courses which were required as part of Lafayette’s religious based curriculum. Lafayette’s engineering classes also evolved in the wake of the Morrill Act of 1962. At Lafayette initially “A student enrolled in the Pardee Scientific Course could if he chose select as a substitute for the standard program of the senior year one of three specialized options, the engineering, the chemical, and the mining” (Gendebien, 1966.)

Metallurgical Engineering
1937- Metallurgical Studies (Non Engineering)- Degree program (64) relegated to chemistry department (65)
1956- Metallurgical Engineering was established at Lafayette (63)
1963- Metallurgical department joined with other engineering departments in common first 2 years of study (69)
1966- Metallurgical Engineering housed in Markle Hall until this time. (25)
1969- Card catalog definition: Department of Metallurgical Engineering’s primary emphasis is placed on the extraction of metals from their ores and principles which govern alloying shaping, heat treating and practical selection and application of metals and other engineering materials.
1989-1990 Last time Metallurgical Engineering was referenced in the Course Catalog (Course Catalog 1989)

Paragraph: Metallurgical studies were deeply rooted in chemistry and individuals educated in this field peaked in decades following WWII. At Lafayette, since the start of the Pardee Scientific Courses of Study, Metallurgical Engineering concepts were deeply embedded in the mining department curriculum. “Since the 1860’s the development of the course of study has paralleled the advance of scientific discovery and the region’s expanding technological needs - first in the curriculum of the mining department, then under the chemistry department, then back to mining and finally with full independence as a separate discipline” (70). With a decrease in demand, Metallurgical Engineering was removed from Lafayette Curriculum at the end of the 1980’s.

Administrative Engineering
1922-23-Administrative Engineering was introduced to Lafayette (52)
1922- “The curriculum of the course in Administrative Engineering is planned to give a suitable technical training in preparation for minor executive positions in manufacturing industries with the belief that advancement to greater responsibilities will be more rapid for those so equipped. There are many important positions in any plant for which a knowledge of the elements of engineering practices and the fundamental theories of business economics form a desirable combination. With this idea in mind the advanced design of the mechanical engineering course and the mechanics and mathematics which directly prepare for it have been dropped in making the Administrative Engineering curriculum and courses in accounting, business finance and labor legislation substituted. It should be clearly understood that this course will not prepare students for positions as design or construction engineers, nor as operating engineers for power plants or mines. Those who contemplate entering strictly technical work are advised to take one of the regular engineering courses.” (Catalog 1922-1923, 95)
1925- 11 degrees of B.S. in A.E. were granted
1954- Administrative Engineering was changed to Industrial Engineering (55)

Paragraph: Administrative Engineering at Lafayette College came about out of the ashes of WWI when the economy “demonstrated need for college trained men not only as practicing engineers but also as engineer-oriented executives in general management.” There was a demand for these men to be knowledgeable in such fields as economics, finance, and law. This was evident that by the mid 20th century most engineers were employed by private industry and there was a strong desire for these engineers, who eventually earned managerial positions, to be trained to fill those roles (Reynolds, 1991). The proposal to create an administrative engineering major was first introduced at a Lafayette faculty meeting in 1922 and was adopted almost immediately. The goal was to prepare trained engineers for managerial positions (52).

Industrial Engineering
1954-55 Administrative Engineering was changed to Industrial Engineering (55)
1954-55 “The industrial engineering curriculum is planned to give suitable technical and
management training in preparation for position in manufacturing industries where knowledge and experience in manufacturing techniques will lead to greater responsibilities in manufacturing management. There are many important positions for which the study of the elements of engineering practice, the fundamental theories of business economics, and the concepts of human relations form a desirable combination. With this idea in mind such subjects as accounting, business finance, psychology, and Labor Relations have supplanted the advanced design subjects of the other engineering curricula. Emphasis is placed on the production side of engineering, and considerable time is devoted to the study of manufacturing techniques” (Course Catalog 1954, 105).

1969- End of Industrial Engineering. Curriculum Committee recommended the termination of the program. (80)
1972- No major is offered in Industrial Engineering, effective with the Class of 1972 (Course Catalog 1969, 180).

Paragraph: Industrial Engineering evolved out of the Administrative Engineering program, but classes in Industrial Engineering had been offered separately for some time before Administrative Engineering had changed its name. The reason for this name change occurred because of a general confusion between the two types of engineering, which were used interchangeably by the Department of Labor to describe the same types of jobs (55).

**Engineering Science Department**

**Engineering Studies (AB Program with Engineering Major 1970 definition)**

1922-23- Administrative Engineering was introduced to Lafayette (52) (Precursor)
1970- start of the Engineering Studies major with recommendation of Liberal Arts- Engineering Subcommittee and Engineering Council. (83)
1970- “Acting on the conviction that society needs more liberally-educated persons with technical backgrounds, Lafayette has established a major in engineering under the Bachelor of Arts degree program. A flexible program, incorporating the recommended liberal education courses of the A.B degree program and the technical studies of the engineering program, this is especially helpful for the professional who will work with engineers and who needs a social-political background to deal effectively with technological projects.” (1970 Course Catalog, 31)
2008- Name Change to Engineering Studies in the Card Catalog (Course Catalog 2008, 111).
2011- “This degree provides a technical yet broad education that spans the physical and social sciences and the humanities; it is a liberal education for a technological age. Students who choose this major value the analytical skills and technical literacy that the study of engineering provides. They do not intend to practice as design engineers, but want to be able to understand and communicate technical concepts and issues. The curriculum provides a sound background in mathematics and physical science; basic engineering knowledge and problem-solving skills; concepts and analytical techniques relevant to specific areas of engineering; sensitivity to societal concerns through courses in history, government, economics, literature, and foreign cultures; and an understanding of human behavior through courses in psychology and sociology.” (Course Catalog 2011)

“Discussing the small number of women in engineering in 1970, one study concluded that few women experienced “unjustifiable discrimination” when attempting to enter the
profession. Instead, the report concluded employers excluded women from engineering on the basis of “economically justified” reasons. These included the fact that women commonly married, left a region when a husband received a job transfer, or experienced “breakdowns in childcare arrangements” (Race, Rigor, and Selectivity in US Engineering page 110. women--> AB liberal arts degree)

“In some ways, through the 1960s and 1970s American engineering departments displayed an unusual level of attention to the larger social conditions in which they functioned.” (Race, Rigor, and Selectivity in US Engineering page 113)

Paragraph: The Engineering Studies Department came into being out of the ashes of the Industrial Engineering Program. A liberal arts-engineering subcommittee of the 1969 Curriculum Committee first offered the recommendation for an A.B degree in engineering. One of the committee members was quoted as saying “our present society, and more so our future cultural environment, calls for people educated under a redefined liberal education which recognizes the many technical complexities of the 20th century living.” (83). This major was also representative of general trends in recognizing current limitations in engineering education in the 1960’s where society was demanding a response to “what they saw as an overemphasis on scientific training and a consequent loss of professional identity (Wisnioskik, 2009).