

***ASEE First-Year Program Division Workshop***  
***Improve Student Academic Performance and Retention –***  
***The Design Your Process to Become a World-Class***  
***Engineering Student Project***

presented at:

123rd ASEE Annual Conference & Exposition, New Orleans

Sunday June 26, 2016, 9:00 AM to 12:00 PM

Steffen Peuker, Ph.D.  
James L. Bartlett, Jr. Assistant Professor  
Mechanical Engineering  
California Polytechnic State University  
San Luis Obispo, CA 93407  
email: [speuker@calpoly.edu](mailto:speuker@calpoly.edu)

Raymond B. Landis, Ph.D.  
Dean Emeritus of Engineering, Computer Science, and  
Technology  
California State University, Los Angeles  
Los Angeles, CA 90032  
email: [rlandis@exchange.calstatela.edu](mailto:rlandis@exchange.calstatela.edu)

Gayle E. Ermer, Ph.D.  
Professor  
Mechanical Engineering  
Calvin College  
Grand Rapids, MI 49546  
email: [germer@calvin.edu](mailto:germer@calvin.edu)

Dr. Krishna Pakala, Ph.D.  
Clinical Asst. Prof. & Faculty-in-Residence (ERC)  
Mechanical & Biomedical Engineering  
Boise State University  
Boise, ID 83725  
email: [krishnapakala@boisestate.edu](mailto:krishnapakala@boisestate.edu)

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## About the Presenters

### **Dr. Steffen Peuker, California Polytechnic State University**

Steffen Peuker holds the James L. Bartlett, Jr. Assistant Professor position in the Mechanical Engineering Department at the California State University in San Luis Obispo. He is teaching courses, including laboratories, in the HVAC concentration and mechanical engineering including first-year courses. Dr. Peuker's educational research focuses on increasing student retention and success in engineering through implementation of a student success focused approach in introduction to engineering courses. In addition, his work in engineering education focuses on collaborative learning, student-industry cooperation, and developing innovative ways of merging engineering fundamentals and engineering in practice and research. He can be reached at [speuker@calpoly.edu](mailto:speuker@calpoly.edu).

### **Dr. Raymond B. Landis, California State University, Los Angeles**

Raymond B. Landis is Dean Emeritus of Engineering, Computer Science, and Technology at California State University, Los Angeles. He is a nationally recognized expert in the field of engineering student success. His three-day Chautauqua short course "Enhancing Student Success through a Model Introduction to Engineering Course" has been attended by over 1,000 engineering educators over the past 25 years. He is the author of *Studying Engineering: A Road Map to a Rewarding Career*, now in its Fourth Edition. Since its initial publication in 1995, the text has been used by over 150,000 students at more than 300 institutions across the United States in Introduction to Engineering courses that have a focus on student development. Dr. Landis has received many honors and awards for his work, including the Presidential Award for Excellence in Science, Math, and Engineering Mentoring, and the first Wang Family Excellence Award as the outstanding administrator in the California State University System. He was cited as one of the top 100 educational leaders of the 20th century by *Black Issues in Higher Education*.

### **Dr. Gayle E. Ermer, Calvin College**

Dr. Gayle Ermer is a professor of engineering at Calvin College in Grand Rapids, MI. She teaches in the mechanical engineering concentration in the areas of machine dynamics and manufacturing processes. Her master's degree was obtained from the University of Wisconsin, Madison, in manufacturing systems engineering (1987), and her Ph.D. from Michigan State University (1994) in mechanical engineering. Her research interests include philosophy of technology, engineering ethics, and women in engineering.

### **Dr. Krishna Pakala, Boise State University**

Dr. Krishna Pakala is a Clinical Assistant Professor at Boise State University, Idaho. His academic research interests include innovative teaching and learning strategies, use of emerging technologies, and mobile teaching and learning strategies.

## Introduction

Many students come into an engineering program lacking a strong commitment to stay in an engineering program and to graduate with an engineering degree. For students to accomplish the challenging goal of graduating with an engineering degree requires a strong commitment, and behaviors and attitudes to follow through that commitment. To strengthen the commitment of the freshman engineering students, an innovative project has been developed. The project challenges students to develop their process to become a "World-Class Engineering Student". Having freshman engineering students design their individually tailored learning process as part of a semester long project in the setting of a student success focused introduction to engineering course—or any freshman engineering course—will have a significant impact on their academic success by improving the students' confidence and motivation to succeed in engineering.

This package is meant to help instructors implement the project "Design your Process for Becoming a "World-Class" Engineering Student" in their courses. The project was implemented by Steffen Peuker at the University of Alaska Anchorage (UAA) in the Fall 2012, Spring 2013, Summer 2013 and Fall 2013 as part of the Introduction to Engineering course and is currently implemented at over 30 other institutions. Although most of the material presented here is from the implementation of the project at UAA, a one credit hour, 50 minutes per week course, the hope is that you find the material useful and please feel free to copy/use as much or as little as you see fit for your purpose.

We would greatly appreciate any feedback from you and please feel free to contact the authors with any questions/comments you might have.

Thanks,

Steffen, Ray, Gayle and Krishna

## The Core Idea

Students can do much more than they do (and you can make it so):

- Only 40-50 percent of students who start engineering programs in the U.S. ever graduate in engineering
- Those who do graduate probably work at about 70 percent efficiency (2.8/4.0 GPA)
- Overall efficiency of engineering education is between 28-35 percent
- Between 65-72 percent of our potential is wasted.
- Academic performance and retention of certain subgroups of students is differentially lower

There is a gap between attitudes and behaviors we want from students and the attitudes and behaviors we get from students. The goal of student development is to close this gap by changing students' attitudes and behaviors to those appropriate to success in math/science/ engineering coursework. Here is a list of mistakes student tend to make which are directly linked to a "wrong" attitude:

- **Naivete** – Engineering study will be like my high school experience.
- **Weak commitment** - I'm not sure I want to be an engineer - weak commitment.
- **Self confidence** - I lack confidence in my ability to succeed in engineering study.
- **Self sabotage** - I have a tendency to sabotage my success.
- **External locus of control** - I tend to blame others for my failure.
- **Fixed mindset** - I don't see any need to change myself or to grow or develop.
- **Aversion to seeking help** - I'm generally unwilling to seek help from others.
- **Procrastination** - I tend to procrastinate, putting off the things I need to do.
- **Avoidance behavior** - I tend to avoid doing things that I don't enjoy.
- **Shallow** – I have difficulty focusing on complex problems.
- **Unwillingness to read** – I hate reading.
- **Fear of professors** - I avoid contact with my professors outside the classroom.
- **Lone wolf syndrome** - I prefer to study alone rather than with other students.

Mistakes can also be linked to the "wrong" behavior students might have, such as:

- **Overcommitted** - Program themselves for failure through too many commitments
- **Non academic environment** - Spend little time on campus
- **Effort/Time on task** - Neglect studying
- **Procrastination** - Delay studying until a test is announced
- **Lone wolf approach** - Study 100% alone
- **Preparation** - Come to each lecture unprepared
- **Avoidance of authority figures** - Avoid professors (in and outside of the classroom)
- **Class attendance/attention** - Cut classes and/or don't get the most out of lectures
- **Note taking** - Fail to take notes or take notes but fail to use the notes properly in the learning process

- **Focus on grade not learning** - Skim over the material in the text in a rush to get to the assigned homework problems
- **Problem solving** - Fail to solve the assigned problems. Don't approach problems using a systematic problem solving process

From years of teaching and observing first-year engineering students our anecdotal conclusion is that 90% of first-year engineering students are on the wrong side of the top five or six behaviors for success in math/science/engineering coursework (you can check this for yourself in your course!).

How do we solve this crisis? What does not work is to tell people, or first-year students, how to run their lives. For example, I can tell my students to study at least 25 hours a week, eat healthy, exercise regularly, attend office hours etc., yet why don't my students do all of it?

What does work? Turning it over to your students to figure it out for themselves works by holding up a "mirror" for them to look into, guiding them in reflecting on a number of issues related to their learning process and using the power of group problem solving to find the answers.

The ***Design Your Process of Becoming a "World-Class" Engineering Student*** is the ultimate student centered approach which can be implemented in almost any first-year engineering course.

## Project Statement

### Design your Process for Becoming a “World-Class” Engineering Student

Engineers “design products or processes to meet desired needs.” In engineering education, most of the focus is on designing products. Through this project you will design a process. You will “Design Your Process for Becoming a ‘World-Class’ Engineering Student.” The text *Studying Engineering* will be a valuable resource in this design project.

#### Task:

For each of the following items, develop a plan that will indicate:

- a. Where a “world-class” engineering student would want to be on each item
- b. Where you are currently on each item
- c. What you need to do to move from where you are to where you would need to be to become a “world-class” engineering student

#### Items:

1. Set goal(s) for what you want to achieve through your engineering education (major, time to graduation, GPA, etc.) and beyond
2. Develop a strong commitment to the goal of graduating in engineering by:
  - a) Clarifying what success in engineering study will do to enhance the quality of your life (rewards, benefits, opportunities, payoffs, etc)
  - b) Understanding the essence of engineering (be able to articulate an answer to the question “What is engineering?”)
  - c) Being aware of past engineering achievements, current opportunities (academic disciplines, job functions, industry sectors) and future directions.
  - d) Preparing a “road map,” a term-by-term plan to guide you to graduation
  - e) Other strategies identified by you.
3. Be prepared to deal with inevitable adversity
4. Do a good job of managing various aspects of your personal life including interactions with family and friends, personal finances, outside work, and commuting.
5. Change your attitudes to those appropriate to success in math/science/engineering coursework. Among those that are candidates for change are:
  - a) Low self-confidence or overconfidence
  - b) Reluctance to seek help
  - c) Resistance to change, grow, develop, improve
  - d) Tendency to procrastinate
  - e) Avoidance behavior (avoid difficult or unpleasant tasks)
  - f) Reluctance to study with other students
  - g) Negative view toward authority figures
  - h) Other negative attitudes identified by you

6. Understand teaching styles and learning styles and how to make the teaching/learning process work for you.
7. Understand and practice the concept of “metacognition” to improve your learning process by observing your learning process, feeding back to yourself what you observed, and making changes based on that feedback.
8. Change your behaviors to those appropriate to success in math/science/ engineering coursework to include at least:
  - a) Devoting adequate time to studying
  - b) Adopting the principle that you master the material presented in one class before the next class comes
  - c) Make effective use of your peers through sharing information and group study; build productive relationships for college and beyond
  - d) Make effective use of your professors both inside and outside of the classroom
  - e) Prepare for lectures by reading ahead, attempting a few problems, formulating a few questions
  - f) Other behaviors identified by you
9. Manage your time and tasks effectively
10. Understand the principles of teamwork and leadership and develop skills to be both an effective team member and also an effective team leader
11. Participate in co-curricular activities to good benefit
12. Understand and respect differences in learning styles and personality types and in ethnicity and gender
13. Engage in good health and wellness practices including management of stress
14. Develop a high sense of personal and professional integrity and ethical behavior
15. Become effective at getting what you want and need from the educational system by utilizing campus resources (such as advising, tutoring, job placement services, health center, etc)
16. Add up to three additional objectives that you perceive are important for your success in engineering study

**Deliverable:**

Describe your plan in a 10-12 page report



**Example Student Report**

**University of Alaska Anchorage - School of Engineering**

**ENGR A151 - Introduction to Engineering - Fall 2012**

**My Process to Become a "World-Class" Engineering Student**

**by**

**December 4th, 2012**

## **Introduction**

Graduating with a Bachelor of Science degree in Civil Engineering is currently my major goal. I chose the field of Engineering because I would like to use knowledge of the natural world around me to help people and help the world advance. I have enough confidence in myself to know that this is something I can achieve if I just set my mind to it and take in all the knowledge around me that I can. As of now, the only thing that is keeping me from obtaining that goal is that there are decisions I need to make, goals that need to be set, and attitudes and behaviors that need to be developed. In the following sections I will outline those goals, steps, attitudes, and behaviors that need to be established so that I may become a “world-class” engineering student.

## **Why Do I Want to Be an Engineer?**

Up until about a couple months ago I completely felt like I was starting off in the wrong field of study. The only reason I signed up for engineering classes was because I had been told time and time again that I would be an incredible engineer. After reaching college math in high school and getting amazing scores, I had both parents and teachers encouraging me to go into the field of engineering. They told me it was a great field to go into because of the many opportunities available (especially for women) and the guarantee of financial security. I must admit that these were convincing arguments, but I still wasn't sure whether it was the career that best defined “me”. After reading about the field of engineering and the diversity in which the field can be applied, I discovered I was in the right place and engineering was the career for me. Maybe my parents and teachers knew me better than I thought.

One of the first things about engineering that caught my attention and led me to realize that it was the career for me was the fact that in getting a Bachelor of Science degree in engineering, absolutely no doors are closed from there on out and I have the ability to become whatever I want. This is one of the things that scared me most in choosing a career, the fact that in choosing one path, all other paths were closed. But going into engineering, I don't have to know just yet exactly who I want to be or exactly what I want to accomplish, all I have to do is get a general idea of the path I want to take and from there on just learn as much as I can. In my opinion, one of the biggest benefits in engineering is the freedom and diversity offered in this career.

The second thing that really caught my attention about engineering is that it requires an analytical and logical mind that still has the capacity for creative thinking. This describes my brain perfectly as I have always been a very analytical and logical thinker with a passion for creativity. I have always loved the type of problem solving where you look at a problem from many different viewpoints and then throw around very out-of-the-box solutions. I've been told that I have a very abstract mind and interesting way of looking at things, so I feel that I could offer a beneficial viewpoint to many engineering problems that face the world today. I feel very happy to have discovered the field of engineering because not many careers require you to access both the left and right side of the brain as deeply as engineering. I am a person that is highly active in both the left and right side of the brain; I have the mental ability to follow mathematical, logical concepts yet at the same time my mind is constantly wandering to all the possibilities of the world. Engineering is a career where I can utilize my brain entirely, without neglecting one side of my brain. I think that an even balance of left and right brain is absolutely necessary in Engineering because without knowledge, many things could not be developed, and without

creativity, many things could not be imagined. This understanding of Engineering helped me realize that it is one of the only careers where I will be able to use my brain to its full potential.

Another thing that struck me about engineering is the possibility of what I could accomplish. I have always been the kind of person who is very aware of the world and cares about the issues that society faces. I dream of taking all the knowledge that I gain throughout my life and using it to help others. I want to change the lives of others in a positive way so that they have the ability to live a satisfying, happy lifestyle. My interest specifically lies in helping the underdeveloped, struggling communities that need outside knowledge the most. I would really enjoy traveling to other countries and initiating projects to improve poor conditions and struggling lifestyles of people in these underdeveloped communities. Not only would I want to help these communities but would also want to learn about the culture that makes up their everyday lives and what insights they have to offer. Ultimately I want to use my logical understanding of the world to make connections with the world. I want to travel, help people, learn new things, and ultimately expand my horizons. I feel engineering could offer all of these opportunities.

Lastly, but not most importantly, I would like to become an engineer for one of the most typical reasons, financial security. I feel that financial security is very important to me, as it will help me lead a healthy, unburdened lifestyle where I will be able to provide for a family in the long run. Further than that I will be able to offer my family opportunities that people in poverty or lower income jobs could not offer. In general I feel that engineering is a career that opens all the possibilities of the world. I know that the road ahead will be a difficult one, but it is something that anyone can accomplish if they really put their mind to it. Now that I have my mind set to it, I know that I am ready to embark upon my path to become an engineer.

### **My Learning Style**

Before I can make my way to becoming a “world-class” engineering student I need to know my preferred style of learning so that I can understand how I learn new knowledge most effectively. In order to figure out my learning style, I took the Index Learning Styles Questionnaire. According to this questionnaire, my style of learning is:

- Sensing vs. Intuitive
- Visual vs. Verbal
- Reflective vs. Active
- Sequential vs. Global

I completely agree that I am both very reflective and sequential in my learning methods, as I like to think through things on my own and in a very logical order. But the type of information I prefer and the sensory channel through which I perceive information most effectively definitely came as somewhat of a surprise to me. I thought that I would prefer intuitive information rather than sensing information and more verbal styles of learning rather than visual styles of learning.

As for my preferred sensory channel it is not completely off, it is just in the middle of verbal and visual learning styles leaning towards the visual learning style. Perhaps I see more importance in words but get more knowledge out of images than I give them credit for. I definitely am a very visual person, but I feel that words

give more insight than visuals. Maybe the pairing of both words and visuals is the most effective way for me to perceive information. I feel that this is a good thing because both facts and visuals are what most teachers tend to incorporate in their teaching.

As for the type of information I prefer, I was very surprised to see the results on the opposite side of the spectrum from intuitive information. I've always seen myself as a very intuitive thinker, but maybe that's just my way of thinking, not the way I like to learn. Maybe I like to learn things in a methodical manner but later think about them intuitively. Either way, maybe it is a good thing that I see myself as an intuitive learner even though I may not be one now, because that means it will make it easier for me to grow from a sensual learner into an intuitive learner making me a better fit for the field of engineering.

The main thing I would like to change about my learning habits is the way I learn information. I usually just learn facts and don't apply them intuitively to the world. I am very good at memorizing facts and passing tests, but I need to take my education beyond that. I need to take the facts I learn from classes and apply them to the real world because eventually, once I'm an engineer, that is what I will be doing and I need to practice that skill now.

### **Making the Change from High School to College**

At the start of my journey of becoming a "world-class" engineering student, I am introduced to a completely new environment. High school and college are very different and so I must understand the differences as well as what behaviors and habits must be changed. Outlined below are the differences I noticed between high school and college and the changes that need to be made so that I can become a fully adapted college student.

The first difference I noticed in the teaching/learning process of college and high school is the type of information that is taught and how that information must be processed. In high school, what is mainly required of students is memorization of facts for a topic. In college the topics discussed are much more in depth and focus more on concepts and how you can apply the concepts to the given field or the world. I feel that a good way to adjust to this is by viewing everything being learned from a larger perspective and by finding connections between multiple courses so you can see how everything relates in the grand scheme of things. I feel that this would help take what is learned in class from simple facts to concepts that can actually be applied to other classes or the world itself.

One of the main reasons why college is so much harder than high school is because in high school, topics are covered over and over in class. In college information is usually not repeated so it is expected that the students go over the information themselves. I feel that the best way to adjust to this is by scheduling "reiteration study sessions" where the material from each class is gone over. This would be like having more time in class to go over information, like in high school where the information is reiterated over and over again, but the only difference is that it is the responsibility of the student to find time to do this.

Another big difference I noticed in college is that so much more time is spent outside of class doing work than in class. That means that it is the responsibility of the student to make time to do this work. I actually think spending less time in class and more time outside doing work is better because it gives the student the

opportunity to go on their own time frame as well as use only the time that is needed. In high school a lot of time for students is wasted because they finish what they needed to do but are still required to stay in the classroom. The restrictive nature of high school also puts constraints on the freedom of the students, as they are expected to attend class every weekday, whereas in college the classes are short and vary to fit the students scheduling needs. So finding time outside of class to do work was very easy for me to adjust to, as it is a much more practical method for schooling.

I have found that being in college there are many more opportunities to go out and seek help than in high school. In high school the only real resources available are teachers, who are usually busy, and other students in class, who usually need help as well. In college there are many centers filled with volunteers just waiting to give out their knowledge and the teachers are just as willing to offer help. I feel like these are very valuable resources that everyone should take advantage of and incorporate into their studying habits. Although, this is something I will have to adjust to, as I am not used to having many places to go to seek help. In order to adjust to this I must get in the habit of using these resources if I ever need help rather than just trying to go at it alone.

The last thing I noticed about college is that there are many more opportunities to meet people in your field of interest than in high school. In high school everyone is just bunched together by location, but in college people come from all over the place to study in their field of interest. This allows you to meet people in your field of interest, which you can interact with and seek help from. Usually it is a little difficult for me to meet new people, but in college it is easier since I am around people with similar interests. I would like to adjust to this aspect of college by meeting many new people in my field and interacting with them outside of class.

The two major mistakes that I know I make as a college student are,

- 1.) I spend little time on campus, and
- 2.) I study alone.

These are bad habits that I definitely need to change.

The first problem I have, that I spend little time on campus, is largely due to being used to the high school environment. In high school, once school was over the teachers wanted you out of class and the security guards wanted you to go home. So I was used to going to my classes and then leaving immediately after my classes without spending any time in school to meet with teachers or other students. I can start adjusting to this by first taking the gaps I have between classes to stay on campus and study rather than going out for lunch or going home. Staying on campus at these times would be an efficient use of time, as well as gas. Another way I could change this is by making the campus my study environment and recreational environment. This could help me use my time more efficiently and possibly give me more free time to do fun things or get the relaxation needed to focus on my studies. I also feel that spending more time on campus would help me get work done more effectively as it will keep me from the distractions I would have at home, and then allow me to give in to those distractions once I get home.

Another mistake I make as a college student is that I usually study alone. The reason why I usually work alone is because I feel like I get more work done when I don't have distractions from the outside world. I also

feel like anything I'm learning, if I try hard enough, I can figure out myself. But maybe it is best that I look to others for help, because in the end what others can teach me are not only the things I don't understand in class, but also things about life in general. In order to change this habit of studying alone I would like to meet more people in my field of interest that would like to study in groups and schedule study sessions where we can all work together. I feel that it would be very helpful to be studying with people in the same field of interest as we can share not only knowledge on topics in class but viewpoints on the field that would give me a better insight into my own career path.

Solving these two problems go hand-in-hand; spending more time on campus will allow me to meet new people in my field of interest that I can create study groups with, and in creating these study groups I will have a reason to spend more time on campus. So solving one problem will also help solve the other, and help me to become a better college student.

### Priority Management

Being an engineering student one of the most important traits to have is an ability to prioritize. This means choosing to do things that are more important over things that are fun sometimes. People who prioritize generally are able to complete tasks in a less urgent manner and usually perform better. The best way to prioritize is to organize any tasks or activities into a matrix with four quadrants. The first quadrant is for tasks that are urgent and important, the second quadrant is for tasks that are not urgent but important, the third quadrant is for tasks that are urgent but not important, and the fourth quadrant is for tasks that are not urgent and not important. Here is an example of a priority matrix that I made this past semester:

<b>I Urgent and Important</b> <ul style="list-style-type: none"><li>-Choose a major</li><li>-Set-up a "Road Map"</li><li>-Write an outline for my project</li><li>-Change bad attitudes or behaviors</li><li>-Study for midterms</li><li>-Start studying with my peers</li></ul>	<b>II Not Urgent, Important</b> <ul style="list-style-type: none"><li>-Assignment #6</li><li>-Write paper</li><li>-Study material learned in lectures today</li><li>-Play guitar</li><li>-Dance</li></ul>
<b>III Urgent, Not Important</b> <ul style="list-style-type: none"><li>-Answering a phone call</li><li>-Friends coming over</li><li>-Checking a notification on Facebook</li><li>-Favorite show on T.V.</li></ul>	<b>IV Not Urgent, Not Important</b> <ul style="list-style-type: none"><li>-Watching T.V.</li><li>-Pointlessly searching the internet</li><li>-Facebook</li><li>-Napping</li></ul>

From making this matrix I learned that my items are not organized how they should be. There are more items in the urgent and important quadrant than in the not urgent, important quadrant, which is where they should be. My matrix is not that terrible as I am not a big fan of procrastination so assignments are usually checked off my list of things to do quickly. The things that I usually put off until the last minute are things such as long-term goals. It is easy for me to knock out weekly assignments because I can get them done in one sitting

and that is how I work best. But when it comes to studying for tests or working on long-term goals, it requires time dedicated over an extended period and I am not good at spreading things out like that.

This is the reason why all the things in the first quadrant that are urgent and important are things like determining my major, setting up a “Road Map”, getting started on a semester long project, changing attitudes and behaviors, and studying for tests. These things all require work over an extended period of time. Making this priority matrix made me realize that I have a harder time working on long-term assignments than short-term assignments, something that I did not think about before.

I should try to change this problem by dedicating time each week to long-term assignments and goals. This time does not have to be very long, as I only need to be taking baby steps in my long-term assignments and goals. For example, I could start by taking some time this week to write down my goals as an engineer and possibly choose a specific field of engineering. If I achieve that, then I could also create a “Road Map” which should not be very difficult to do once I choose a major. Taking this baby step in choosing my career will make it so that in the future choosing the correct classes or internships to become a part of will not be in the urgent and important quadrant. If I make clear my goals now then choosing those things mentioned above would suddenly fall under the not urgent but important quadrant, as I will have a clear idea of what I want and therefore can make decisions in a calmer mindset.

I also need to start working on my attitudes and behaviors that need to be changed as well as start studying with my peers. If I don’t start working on these things now, then when I enter the engineering work force those attitudes and behaviors necessary for the field and the ability to work with peers will suddenly become urgent and important skills for me to develop. I don’t want to be in a position where I have to play catch-up in my personal behaviors and attitudes because that could seriously get me behind in the working world and cause me to lose many opportunities as an engineer. It is best to begin working on these skills right now, so that when I come out into the real world I am not just a student with knowledge of engineering, but already a practicing engineer with the knowledge AND skills necessary to become a great engineer.

### **Choosing Productive Actions**

One of the most important steps for becoming a “world-class” engineering student is choosing productive actions. Choosing productive actions starts with turning our thoughts from negative ones to positive ones. In the following paragraphs I will discuss the negative thoughts that prevent us from choosing productive actions and how to change those negative thoughts to positive ones so that we may choose productive actions.

The first and most common thing that stops us from choosing productive actions is that most of the non-productive actions we do usually satisfy some need. In order to change these non-productive actions into productive actions, the non-productive actions that satisfy some need must either be replaced with productive actions that satisfy the same need or time must be scheduled accordingly so that the non-productive actions do not interfere with productive actions. A good example of this change from non-productive actions to productive actions would be with the need to hang out with friends. The time used to hang out with friends could either be scheduled in a way that didn’t interfere with school, or homework and studying could be done with friends, which in many cases is a much better learning environment. As we can see here, the need is still satisfied but the

actions are productive and only bring the student closer to his or her goals, rather than taking the student further from those goals.

Another barrier that must be overcome is that productive actions are thought to be difficult and un-enjoyable in general, so instead of choosing tasks that are unpleasant we choose to do things that are pleasant, which are usually non-productive actions. The best way to overcome this barrier is by making the task less daunting in our mind. If we change the way we think about the task from a negative thought to a positive thought then it would make the task seem less unpleasant. A good strategy for doing this is to look at the big picture rather than the individual assignment. For example, rather than thinking "I am not looking forward to doing my Calculus homework", think instead "I am excited about getting my Bachelor of Science degree in engineering". If we look at things this way then we find a purpose in the small and unpleasant tasks we must complete in order to achieve our long-term goals. Another good strategy for completing tasks that may be unpleasant is to tell yourself that you will work on the task for five minutes, if after five minutes you can continue without frustration then keep working until the assignment is either finished or help is needed. If after five minutes you can't get anywhere, go seek out help. Working with others is usually a lot easier, and a lot more fun than working alone anyways.

Another barrier that I would like to discuss is that a lot of people are afraid of failing if they do attempt productive actions. The only advice I have for people who feel this way is that sometimes grades don't always reflect ability, so even if a discouraging score is received, keep going and keep trying. The only way to ever really fail at something is to not even try at all. Not trying because of a fear of failure almost guarantees failure, so if failure is a huge fear then at least give difficult tasks a shot and eventually the effort put in will show. Just remember the motto of the Minority Engineering Program of California State University, Northridge, "No deposit, no return". [1] If we remember this, we see that just trying, or in this case depositing, gives us at least a small chance at having some return, rather than no chance of having any return at all.

Another barrier to choosing productive actions is a preference to place the blame for failures on other people or external factors rather than taking responsibility for failures. The best way to fix this is by first taking in the easier realization that successes are a result of one's own individual effort. Once a person can take responsibility for successes they can also begin to take responsibility for failures. If responsibility is taken for both successes and failures we learn that we can change our results or outcomes as well as bask in our successes. This gives a sense of control, which in turn leads to an increased self-esteem. Self-esteem and a sense of control over one's life are both traits that can lead to great academic success.

Other barriers from productive actions that I feel must be overcome are disorders such as anxiety disorders, ADHD or ADD, and depression. Many teens and college students suffer from these disorders in today's population. We must learn how to treat these disorders accordingly so that we can be mentally stable enough to be able to do productive tasks. If a person is not mentally stable, it is sometimes very difficult to do even simple tasks, so it is very important that these things be taken care of before they have a major negative impact on academic success. Medication and therapy is offered for many disorders nowadays and I feel that these treatments should be used in order to promote the highest amount of success possible.



If all of these barriers from positive actions can be overcome, then I can move closer to the achievement of my goals. Whenever I find myself dreading something I should be doing, all I need to do is change my mind set as mentioned above. These strategies will allow me to easily turn all non-productive actions into productive actions, and in the long run bring my goals closer.

### **Managing Stress**

In becoming a “world-class” engineer it is not only important to be a good student, but to be a healthy student, both physically and mentally, and as the field of engineering is quite taxing, stress is common. In order to figure out my personal level of stress I took the “How do you respond to stress” test and discovered that there are many regions in which I am affected by stress. I am affected by stress physically, mentally, emotionally, and socially. Physically, stress affects me with headaches, fatigue, insomnia, colds and a pounding heart. Mentally, stress affects me by giving me a negative attitude and an increased sense of boredom. Emotionally I am affected by stress with anxiety, irritability, depression, and worrying. Socially, stress causes me to feel isolated and lonely. In the paragraphs that follow I will describe how I can cope with these reactions to stress.

I can cope with the physical stress-related problems, such as headaches, fatigue, insomnia, colds, and a pounding heart, by taking care of my general health. A healthy diet and frequent aerobic exercise would decrease the severity of headaches, the constant feeling of fatigue, insomnia, and frequent colds. A healthy diet and frequent aerobic exercise also takes part in reducing stress itself. Other things that should be avoided in order to reduce the physical impacts of stress are caffeine, drugs, alcohol, sleep deprivation, and any dangerous or bad situations.

A step that can be taken to reduce the mental affects of stress, such as a negative attitude and increased feelings of boredom, is to engage in enriching, fun activities on a regular basis. Although my schedule is very busy, I know that there is always a little bit of time left over for fun. If there isn't any time for fun, then I know I need to rethink the way I am living my life. Fun and engaging activities would help to give me a more optimistic outlook, and also decrease my feelings of boredom.

Emotionally, the affects of stress, such as anxiety, irritability, depression, and worrying, can be coped with through the help of friends and family, as well as professionals if necessary. Sometimes I crack from stress because my emotional needs are not being met. When this happens I find it is best to go to those that I am closest to and just talk things out. Letting emotions and feelings out to another human being who cares can do wonders for emotional health.

Lastly, interaction with other people is really the only way to cope with the effects of stress on social life, such as feelings of loneliness and isolation. Meeting new people and making new friends might cause more stress at first, but in the long run it gives a wider range of people to depend on when stress becomes overwhelming. Like the Beatles song goes, “I get by with a little help from my friends”, friends are there when help is needed. They can also help to reduce the feelings of stress in the long-term by creating a relaxing, friendly environment that is usually quite enjoyable.

All in all, every aspect affected by stress can be coped with through a general healthy lifestyle, engaging in fun activities, keeping healthy personal relationships, and getting professional help if it is needed. If I make

these stress preventers a regular part of my lifestyle then I can continue to grow into a “world-class” engineering student.

### **Summary**

In this class I learned many methods for becoming a “world-class” engineering student. I then implemented these methods in my life so that I could work my way towards becoming the best student I can be. First, I evaluated why I would like to become an engineer in the first place. I feel that this step was very helpful as it reminded me of my desired end result, which gave me the motivation necessary to complete tasks that might seem unpleasant but that are working towards my desired end goal. Second, I figured out what my learning style is and how I learn best. Knowing this is very important as it allows me to supplement how my teachers teach with how I learn best. Learning material through my style of learning will help me to retain information in the most effective way possible. Next, I discovered all the changes that needed to be made going from high school to college. Before beginning this project I didn’t even think about how much I would need to change my habits just switching between two different types of schooling. But after analyzing all the differences between high school and college I discovered all the habits and behaviors that needed to be changed. Next, I organized my priorities so that I can complete my degree in the most efficient way possible. By organizing my life into necessary tasks and unnecessary tasks I could prioritize and complete only tasks that help me move forward. This step also goes along with choosing productive actions. In my pursuit of becoming an engineer, I decided that I should only be choosing productive actions if I want to achieve this goal. Along with choosing productive actions, I must also make an attempt to choose positive thoughts and feelings whenever possible. Finally, I worked on the area that needs the most improvement for me, managing stress. I began to realize that if I want to become an engineer I need to learn how to manage my stress so that I can be mentally stable enough to choose productive actions that will lead me towards my goal of becoming not just a “world-class” engineering student, but, even further, a “world-class” engineer.

### **References**

[1] Landis, Raymond B., "Studying Engineering: A Road Map to a Rewarding Career", 3rd Edition, Discovery Press, Los Angeles, California, 2007

**Appendix**

My Road Map to getting my Bachelor of Science degree in Civil Engineering

Year	2012, Fall	Credits	Year	2013, Spring	Credits
	ENGR A151	1		MATH A202	4
	ENGR A161	3		PHYS A211 + L	4
	CPLX A200	3		CE A152	1
	HNRS A292	3		FREN A202	4
	ENGL 212	3		DNCE A490	3
	DNCE A321	2			
	MUS A164	1			
	<b>Total Credits</b>	<b>16</b>		<b>Total Credits</b>	<b>16</b>

Year	2013, Fall	Credits	Year	2014, Spring	Credits
	CHEM A105 + L	4		CHEM A106 + L	4
	MATH A302	4		ES A209	3
	PHYS A212 + L	4		GEO A155	3
	HNRS	3		HNRS	3
				DNCE	2
	<b>Total Credits</b>	<b>15</b>		<b>Total Credits</b>	<b>16</b>

Year	2014, Fall	Credits	Year	2015, Spring	Credits
	Basic Science	3		CE A441	3
	ES A302	3		ESM A450	3
	ES A210	3		ES A331	3
	CE A334 + L	3		HNRS	3
	HNRS	3		FA	3
	<b>Total Credits</b>	<b>15</b>		<b>Total Credits</b>	<b>15</b>

Year	2016, Fall	Credits	Year	2017, Spring	Credits
	Technical Elective	3		Technical Elective	3
	CE A442	3		CE A403	3
	CE A437	1		CE A438	3
	FREN	4		FREN	4
	HNRS	3		DNCE	2
	DNCE	2			
	<b>Total Credits</b>	<b>16</b>		<b>Total Credits</b>	<b>15</b>

**What strikes you as positive/interesting, or noteworthy about this report?**

Brainstorm for 10 minutes in your group.

**Room for notes:**

## Syllabus

### ENGR A151 Introduction to Engineering Spring 2013

3 Sections, Friday 8:30-9:20am, SSB211, 9:30-10:20am and 10:30-11:20am SSB213, 1 credit hr

**Instructor:** Dr. Steffen Peuker  
**Office** Engineering Building, Room 304  
**Phone:** (907) 786-6193  
**E-mail:** speuker2@uaa.alaska.edu  
**Office Hours:** Tuesday 2-3pm, Thursday 9:00-11:30am and 2-3pm

**Text (required):** Studying Engineering: A Road Map to a Rewarding Career, 3<sup>rd</sup> Edition by Raymond B. Landis, ISBN-10: 0-9646969-2-4

#### **Purpose of Course:**

To enhance your success as an engineering student and to help you decide which major engineering discipline to pursue at UAA.

**Grading:** The course will be based on the following:

- Grade on the Journal you keep (30%)
- Grade on homework/assignments (20%)
- Grade on multiple choice exams (20%)
- Grade on Project (30%)

**Attendance: *Attendance is mandatory.*** There will be no excused absences except for reasons mentioned in the UAA Fact Finder Student Handbook. Students missing more than two classes unexcused will not receive credit for the course. ***Sick days:*** Each student has two sick days. Students have to inform the instructor in advance or the day of the class when taking a sick day. To apply a sick day retroactively, a doctor's notice is required. Students are not permitted to attend a different section of ENGR A151 besides the one they are registered for, unless they have permission from the instructor.

**Class Participation:** Regular attendance is required and active participation is expected from each student (as you will experience, this will help you in understanding the course material!).

**Project:** More information about the project will be provided in a separate handout.

**Journal:** A notebook (journal) will be provided for you to be used to document:

- All notes taken in class
- Your opinion of each section of the text
- Questions, issues, or perspectives you gained

**Homework and multiple choice exams:**

There will be a variety of different homework assignments, online surveys, short papers, in-class handouts, etc. which will be announced in class and/or on the course blackboard page. There will be several multiple choice exams throughout the semester. It is your responsibility to check the due dates of the individual assignments/exams. **No late submissions will be accepted. Students missing more than four homework assignments may be dropped from the course.**

**E-mail Communication:** You are encouraged to visit Dr. Peuker during the office hours stated at the beginning of this document. If communicating by e-mail you need to include ENGR 151 in the subject, otherwise the instructor reserves the right to not answer your email. Unless otherwise announced by the instructor, emails will be answered within 48 hours.

**Accommodations:** If you have a disability that may affect your academic experience and are seeking accommodations, it is your responsibility to inform Disability Support Services as soon as possible. Please contact Disability Support Services to arrange for disability related accommodation. The DSS office is in RH 105. Their phone number and email address are available on their website, at [www.uaa.alaska.edu/dss](http://www.uaa.alaska.edu/dss).

**Academic Integrity:**

Academic integrity is a basic principle, which requires that students take credit only for ideas and efforts that are their own. Cheating, plagiarism, and other forms of academic dishonesty are defined as the submission of materials in assignments, exams, or other academic work that is based on sources prohibited by the faculty member. Substantial portions of academic work that a student has submitted for a course may not be resubmitted for credit in another course without the knowledge and advance permission of the instructor. In addition to any adverse academic action, which may result from engaging in academically dishonest behavior, the University specifically reserves the right to address and sanction the conduct involved through the student judicial review procedures. Disciplinary action may be initiated by the University and disciplinary sanctions imposed against any student or student organization found responsible for committing, attempting to commit, or intentionally assisting in the commission of Student Code of Conduct 1: Cheating, Plagiarism, or Other Forms of Academic Dishonesty.

Academic dishonesty is further defined in the Student Code of Conduct. The examples provided below of actions constituting forms of conduct prohibited by the Code are not intended to define prohibited conduct in exhaustive terms, but rather to set forth examples to serve as guidelines for acceptable and unacceptable behavior. (R09.02.020)

Student Code of Conduct 1. Cheating, Plagiarism, or Other Forms of Academic Dishonesty

- a. using material sources not authorized by the faculty member during an examination or assignment;
- b. utilizing devices that are not authorized by the faculty member during an examination or assignment;
- c. providing assistance to another student or receiving assistance from another student during an examination or assignment in a manner not authorized by the faculty member;

- d. presenting as their own the ideas or works of another person without proper acknowledgment of sources;
- e. knowingly permitting their works to be submitted by another person without the faculty member's permission;
- f. acting as a substitute or utilizing a substitute in any examination or assignment;
- g. fabricating data in support of laboratory or field work;
- h. possessing, buying, selling, obtaining, or using a copy of any material intended to be used as an instrument of examination or in an assignment in advance of its administration;
- i. altering grade records of their own or another student's work; or
- j. offering a monetary payment or other remuneration in exchange for a grade.

**Course Calendar:**

The below schedule is subject to change. Changes will be announced in class and/or on blackboard. The assignments are listed when they are *due*, not when they are assigned.

**Class #1—Friday, January 18th**

Reading Assignment: None  
Problem Assignment: None  
Class Discussion: Engineering Student Clubs

**Class #2—Friday, January 25th**

Reading Assignment: Syllabus  
Problem Assignment: Attend Engineer's Friday night  
Class Discussion: Jane and the Dragon

**Class #3—Friday, February 1st**

Reading Assignment: Chapter 1, Project statement  
Problem Assignment: Freshman Engineering Survey  
Exam 1, Homework #1  
Class Discussion: Keys to success in engineering study  
Class Activities: Small group discussions on "ability" versus "effort"

**Class #4—Friday, February 8th**

Reading Assignment: Chapter 2, sections 2.1, 2.2, 2.3, 2.4, 2.5  
Problem Assignment: Exam 2, Homework #2  
Class Discussion: Rewards and opportunities of an engineering career  
Greatest engineering achievements  
Class Activities: What is engineering?

**Class #5—Friday, February 15th**

Reading Assignment: Sections 2.6, 2.7, 2.8, 2.9, 2.10  
Problem Assignment: Homework #3  
Class Discussion: Guest Speaker: Student Success Manager

**Class #6—Friday, February 22nd**

Reading Assignment: Chapter 3  
Problem Assignment: Exam 3, Homework #4  
Class Discussion: Learning and learning styles  
Become an Expert Learner  
Teaching in college  
Class Activities: Differences Between Engineering Study and High School

**Class #7—Friday, March 1st**

**Note: Peer evaluations of journals are due**

Reading Assignment: Chapter 4  
Problem Assignment: Exam 4, Homework #5  
Class Discussion: Early course preparation  
Preparing for lectures  
During your lectures  
Making effective use of your professors  
How to Email Your Professor  
Class Activities: Making Effective Use of Your Professors

**Class #8—Friday, March 8th**

Reading Assignment: Chapter 5  
Problem Assignment: Exam 5, Homework #6  
Class Discussion: Reading for comprehension  
The Forgetting Curve  
Organizing your learning process  
Making effective use of your peers  
Priority Management

**Note: Journals will be collected at the end of class**

**Class #9—Friday, March 22nd**

Reading Assignment: None  
Problem Assignment: Library audio tour, Homework #7  
Class Discussion: Library orientation



**Class #10—Friday, March 29th**

Reading Assignment: Information handout on guest speakers  
Problem Assignment: Prepare questions for guest speakers, Homework #8  
Class Activity: Panel of practicing engineers

**Note: Journals will be returned.**

**Class #11—Friday, April 5th**

Reading Assignment: Chapter 6  
Problem Assignment: Jung Typology Test  
Class Discussion: Personal Development - Receptiveness to Change  
Making Behavior Modification Work for You  
Class Activities: Overcome Barriers

**Class #12—Friday, April 12th**

Reading Assignment: Chapter 6, Section 6.5, 6.6, 6.7, 6.8  
Problem Assignment: Exam 6, Homework #9  
Class Discussion: Personal Development - Receptiveness to Change  
Success  
Maslow's Hierarchy of Needs  
Self-Esteem  
MBTI  
Oral and Written Communications  
Class Activities: Positive Aspects of being a College Student

**Class #13—Friday, April 19th**

Reading Assignment: Chapter 8, sections 8.3, 8.4, 8.5  
Problem Assignment: Homework #10  
Class Discussion: Panel of Engineering Department Representatives

**Class #14—Friday, April 26th**

Reading Assignment: Chapter 8, Section 8.6  
Video Assignment: Incident at Morales  
Problem Assignment: Homework #11  
Class Discussion: Ethics and Academic Integrity

**Project report is due**

## Alternative Project Statement – Shortened Version

### Design your Process for Becoming a “World-Class” Engineering Student

Engineers design products or processes to meet desired needs. Your desired need or goal (hopefully) is to graduate with your Bachelor of Science degree in engineering. But what is the process you need to apply to be successful in achieving this goal?

#### **Task:**

For each of the following items, develop a plan that will indicate:

- d. Where a “world-class” engineering student would want to be on each item
- e. Where you are currently on each item
- f. What you need to do to move from where you are to where you would need to be to become a “world-class” engineering student

By analyzing a. and b. you will be able to answer c., which will tell you what your process to success is! Keep in mind that your report will describe your process to success.

#### **Items:**

##### **1. Goal Setting**

- a. Setting your goal(s), i.e., major, time to graduation, GPA
- b. Strengthening and clarifying your commitment to your goal(s)
- c. Setting up a "Road Map"—a plan to guide you over the next years to graduation
- d. Understanding the essence of engineering

##### **2. Community building**

- a. Building relationships, and making effective use of your peers
- b. Participating in co-curricular activities

##### **3. Academic development**

- a. Navigating the university system, resources and academic advising
- b. Understanding teaching styles and learning styles and how to make the teaching/learning process work for you.

##### **4. Personal development**

- a. Enhancing your self-awareness and improving your skills to practice academic success strategies
- b. Outlining what attitudes and behaviors you need to change/add to be successful
- c. Managing time, tasks and various aspects of your life
- d. Engaging in good health and wellness practices including management of stress
- e. Developing a high sense of personal and professional integrity and ethical behavior

**Deliverables:** Describe your plan in a 10-12 page report

## Alternative Extended Project Statement – Extended Version

### Design your Process for Becoming a “World-Class” Engineering Student

Engineers design products or processes to meet desired needs. Your desired need or goal (hopefully) is to graduate with your Bachelor of Science degree in engineering. But what is the process you need to apply to be successful in achieving this goal?

#### **Task:**

For each of the following items, develop a plan that will indicate:

- g. Where would a “world-class” engineering student want to be on each item
- h. Where you are currently on each item
- i. What you need to do to move from where you are to where you would need to be to become a “world-class” engineering student

By analyzing a. and b. you will be able to answer c., which will tell you what your process to success is! Keep in mind that your report will describe your process to success.

#### **Items:**

##### **1. Goal Setting**

- a. Setting your goal(s), i.e., major, time to graduation, GPA
- b. Strengthening and clarifying your commitment to your goal(s)
- c. Setting up a "Road Map"—a plan to guide you over the next years to graduation
- d. Understanding the essence of engineering

##### **2. Community building**

- a. Building relationships, and making effective use of your peers
- b. Participating in co-curricular activities

##### **3. Academic development**

- a. Navigating the university system, resources and academic advising
- b. Understanding teaching styles and learning styles and how to make the teaching/learning process work for you.

##### **4. Personal development**

- a. Enhancing your self-awareness and improving your skills to practice academic success strategies
- b. Outlining what attitudes and behaviors you need to change/add to be successful
- c. Managing time and tasks
- d. Engaging in good health and wellness practices including management of stress
- e. Developing a high sense of personal and professional integrity and ethical behavior

**Additional Information for Items**

**1. Goal Setting**

- a. Setting your goal(s), i.e., major, time to graduation, GPA
  - What do you want to achieve through your engineering education (major, time to graduation, GPA, etc.) and beyond
- b. Strengthening and clarifying your commitment to your goal(s)
  - Clarifying what success in engineering study will do to enhance the quality of your life (rewards, benefits, opportunities, payoffs, etc)
  - Understanding the essence of engineering (be able to articulate an answer to the question “What is engineering?”)
  - Being aware of past engineering achievements, current opportunities (academic disciplines, job functions, industry sectors) and future directions.
  - Be prepared to deal with inevitable adversity
- c. Setting up a "Road Map"—a plan to guide you over the next years to graduation
  - A term-by-term academic plan, outlining what courses you plan to take to graduation
- d. Understanding the essence of engineering
  - Be able to articulate an answer to the question “What is engineering?”

**2. Community building**

- a. Building relationships, and making effective use of your peers
  - Get to know students in your classes/program/department
  - Build productive relationships for college and beyond
- b. Participating in co-curricular activities
  - Join and actively participate in student organizations including engineering related student organizations (ASCE, ASME, IEEE, etc.)

**3. Academic development**

- a. Navigating the university system, resources and academic advising
  - Become effective at getting what you want and need from the educational system by utilizing campus resources (such as advising, tutoring, job placement services, health center, etc.)
- b. Understanding teaching styles and learning styles and how to make the teaching/learning process work for you.
  - Identify your learning style and your preferred teaching style and how you will use this information to enhance you teaching/learning process

#### 4. Personal development

- a. Enhancing your self-awareness and improving your skills to practice academic success strategies
  - Understand and practice the concept of “metacognition” to improve your learning process by observing your learning process, feeding back to yourself what you observed, and making changes based on that feedback.
  - Understand the principles of teamwork and leadership and develop skills to be both an effective team member and also an effective team leader
  - Understand and respect differences in personality types, ethnicity and gender
- b. Outlining what attitudes and behaviors you need to change/add to be successful
  - Change your attitudes to those appropriate to success in math/science/engineering coursework. Among those that are candidates for change are:
    - Low self-confidence or overconfidence
    - Reluctance to seek help
    - Resistance to change, grow, develop, improve
    - Tendency to procrastinate
    - Avoidance behavior (avoid difficult or unpleasant tasks)
    - Reluctance to study with other students
    - Negative view toward authority figures
    - Other negative attitudes identified by you
  - Change your behaviors to those appropriate to success in math/science/ engineering coursework to include at least:
    - Devoting adequate time to studying
    - Adopting the principle that you master the material presented in one class before the next class comes
    - Make effective use of your peers through sharing information and group study
    - Make effective use of your professors both inside and outside of the classroom
    - Prepare for lectures by reading ahead, attempting a few problems, formulating a few questions
    - Other behaviors identified by you
- c. Managing time and tasks
  - Understand and make effective use of time management and priority management
  - Do a good job of managing various aspects of your personal life including interactions with family and friends, personal finances, outside work, and commuting.
- d. Engaging in good health and wellness practices including management of stress
  - Manage stress through stress-reduction methods
  - Understand the benefits and implement good health and wellness practices
- e. Developing a high sense of personal and professional integrity and ethical behavior
  - Understand professional ethical codes related to your major
  - Be able to identify academic dishonest behavior and how to avoid such behavior

**Some tips to get started on the project:**

- Start early, meaning now!
- Make use of your notes. For example, always write down notes when reading new material before class and during class with focus on how you would implement the topics covered to make them work for you.
- Assignments, in class-activities and homework are aimed to accumulate material which will be very useful for your report, for example there will be a homework where you will need to develop a 4-5 year plan to graduation which you can copy into your report.
- Although this will be your process, study/discuss topics with other students from the course
- Avoid copying verbatim from the textbook or other resources. You can reference to sections of the textbook, e.g., "Understanding the importance of early course preparation, as Landis [1] discusses in Chapter 4.1, will help me to implement the following changes in my attitude and behavior..."

**Length of Report**

The length of the report should be around 10 pages. The minimum acceptable length is 8 pages, there is no maximum page limit. Reports that contain verbatim copied passages without proper citation will receive 0 credit. In addition, reports that contain lengthy copied passages from sources, even if they are properly cited, will be severely marked down.

**Format Requirements**

Your report as to be written in Microsoft Word or some other software program with the following specifications:

- use font styles Arial, Calibri or Times New Roman with a font size of 12
- use 1.5 line spacing
- use 1 inch margins on all sides

Your report needs to have a cover sheet which must include the name of the course, the title of the report, the submission date, your name as the author. You can find a template on blackboard in the "Project" folder.

**Submission Requirements**

Submit a digital copy of your report by [DATE] through blackboard (see the "Project" folder on blackboard). Only doc(x) and pdf files are accepted! Name your file in the following way:

- lastname\_firstname\_ENGR151\_Project

For example, if your name is Steffen Peuker your file name should be: peuker\_steffen\_ENGR151\_Project

## Example Homework Assignments

The table below shows the homework assignments as mentioned in the example Syllabus and how the assignments relate to the Project objectives. The idea is that students generate material throughout the semester for the Project and then compile their material into their final project report. This setup provides students with a repeated exposure of the material. The interpretation which homework corresponds to which objective in the table below is very broad. Depending on the course you are teaching, you can easily add more homework assignments.

1., 3. (1.a.) Setting your goal(s), i.e., major, time to graduation, GPA	Homework #1, #2
2. (1.b.) Strengthening and clarifying your commitment to your goal(s)	Homework #1, #2, #3
2. (1.c.) Set-up a "Road Map"—a plan to guide you over the next years to graduation	Homework #4
2. (1.d.) Understanding the essence of engineering	Homework #3
7. (2.a.) Building relationships, and making effective use of your peers	Homework #5
10. (2.b.) Participating in co-curricular activities	Attend Engineer's Friday night
14. (3.a.) Navigate the UAA system, resources and academic advising	Homework #8
6. (3.b.) Understanding teaching styles and learning styles and how to make the teaching/learning process work for you.	Homework #5
5., 7. (4.b.) Outline what attitudes and behaviors you need to change/add to be successful	Homework #1, #3, #5, #9, #10
9., 11. (4.a.) Enhance your self-awareness and improve your skills to practice academic success strategies	Homework #5, #6, #9
12. (4.d.) Engaging in good health and wellness practices including management of stress	Homework #10
4., 8. (4.c.) Manage time and tasks	Homework #7
13. (4.e.) Developing a high sense of personal and professional integrity and ethical behavior	Homework #11

Note: Numbers in ( ) refer to the alternative project statement objectives (see page 39-42)

### Homework #1

Note: The below homework assignment is related to the story "Jane and the Dragon" which was presented in class to the students (thanks to Dan Budny from the Swanson School of Engineering for the idea of using this story in class!). In summary, Jane befriends the dragon, and this can be used to have students think about what is their greatest obstacle (Math, Physics, Chemistry, etc.) and how they can make it their friend. Here is the statement for the students:

Write a 2 page essay about your "dragon" and how you want to "tame" it. (Your "dragon" should be something you are struggling with related to your studies, feel free to write about more than one dragon).

**Homework #2**

Graduating with a bachelor of science degree in engineering: How important is that goal for you? How can you make it even more important? Write a two page essay.

**Homework #3**

- a) Make your own top ten list of the rewards and opportunities of an engineering career.
- b) Write a 2-3 page paper on "Why I Want to be an Engineer" by expanding on your top three items from a).
- c) Prepare your statement of the question: What is engineering?

**Homework #4**

Note: A USB stick was handed out to the students during lecture containing information such as course catalog copy, flow charts, petition forms, etc., of all the engineering programs offered at UAA. Our student success manager also gave a presentation on student advising. Here is the statement for the students:

Use the information provided on your USB stick and develop your plan—your roadmap—to graduation. In case you have not decided on a major yet, chose the one you are most likely to pursue. Set up a table similar to the provided Course Planning Schedule in Microsoft Word (see template below), which outlines what courses your are planning and when you are taking them (year and Fall or Spring semester). Also include a paragraph when you are planning to look for an internship, joining an engineering student club or other club, and/or what you plan for the summers until graduation.

Year	2013, Spring	Credits	Year	2013, Fall	Credits
	ENGR A151	1			
	Total Credits			Total Credits	



### Homework #5

- a) List the major differences between the teaching/learning process you experienced in high school and the teaching/learning process you will encounter in an university-level math/science/engineering study based on the in-class group discussion. Write a 2 pages reflection outlining strategies for adjusting to each item on the list.
- b) Pick two items from the list of “mistakes students make” we covered in class and write down a commitment how you will implement the required changes mentioned in the right column (1 page).
- c) Go to: <http://www.engr.ncsu.edu/learningstyles/ilsweb.html> and take the survey.
- d) Write a 2 pages reflecting about the results from part c). What do the results tell you, and what changes in your behavior you plan to make based on this new information.
- e) Peer review the journal of another student and provide constructive feedback.

### Homework #6

Pick two of the important academic success skills:

- note taking
- listening
- questioning

and perform an internet search. Gather information from at least 5 different sites and write a 2 page paper on what you learned about these skills and how you plan to implement them. Make sure you list the sites you used at the end of your document and reference it in the text. If you use direct quotations, i.e. you copy directly from the webpage—which you should use extremely sparingly—you have to use quotation marks, for example:

"Real listening is an active process that has three basic steps." [1].

A better way is to rewrite in your own words what you learned from reading the website:

The first webpage [1] emphasizes that listening is an active process and that there are three separate processes: hearing, understanding, judging.

Add the references at the end of your document:

#### References

1. <http://www.infoplease.com/homework/listeningskills1.html>

**Homework #7**

Make a list of at least 20 items/activities you need to do. Think about items/activities which are related to your project. Place each item/activity into the priority matrix. Analyze your matrix, i.e. how many items are in quadrant I, II, III and IV. Write a 2 page reflection what you learned and how you can move items/activities into quadrant II.

<b>I Urgent and Important</b> - - - - -	<b>II Not Urgent, Important</b> - - - - -
<b>III Urgent, Not Important</b> - - - - -	<b>IV Not Urgent, Not Important</b> - - - - -

**Homework #8**

- Choose one of the *Engineers among the World's Wealthiest Individuals* we discussed in class.
- Write a brief paper (minimum 1 page) about how you used the Library's resources and tools to find out more information about the engineer you selected.
- Your paper should include information from at least two (2) of the following types of sources:

- Books
- Journals
- Magazines
- Newspapers
- Websites

**Homework #9**

Write at least one page about today's group discussion: Strategies to overcome barriers to choosing productive actions. Pick your biggest barrier and discuss one or more strategies to overcome them.

### Homework #10

- a) Read the handout "Stress and the College Student" (go to: [http://www.uic.edu/depts/wellctr/docs/Stress and the College Student.pdf](http://www.uic.edu/depts/wellctr/docs/Stress%20and%20the%20College%20Student.pdf))
- b) Do the "How do you respond to stress" test on page 3. Write a 1 page reflection on effective ways of coping with your stress reactions.
- c) Determine your stress score using the test on page 7. Write a short paragraph what this score tells you.

### Homework #11

You will encounter many ethical issues throughout your student career as well as during your professional career.

- a) Take the Academic Integrity Tutorial:

<http://ahi.commonsonuaa.alaska.edu/>

On blackboard under Course Material, you find a link to a video "Incident at Morales" which is meant to expose you to possible ethical problems engineers might face. After watching the video answer the following questions:

- b) Describe and analyze one ethical issues raised during the first segment of the video, up to time index 22:50 min, and outline a possible response or solution (1/2-1 page)?
- c) Describe and analyze one ethical issues raised during the second segment of the video, after time index 22:50 min, and outline a possible response or solution (1/2-1 page)?

**Come up with an assignment which addresses objective 3., “Be prepared to deal with inevitable adversity.”**

Brainstorm for 10 minutes in your group.

**Room for notes:**

## Information on Team Based Learning

### Example iRAT/tRAT

1. What is “The Common Denominator of Success” according to Albert E.N. Gray?
  - a) Working hard to achieve what others don’t
  - b) Forming the habit of doing things failures don’t like to do
  - c) Getting along well with people that are relevant for your success
  - d) Getting a top-notch education
2. What does self-actualization mean?
  - a) Building your self esteem
  - b) Meeting your social needs
  - c) Becoming what you are most suited for
  - d) Having adequate food, air, and water
3. What is self-efficacy?
  - a) Your sense of worth
  - b) Your sense of competence
  - c) Your motivation to excel
  - d) Your productivity
4. Healthy self-esteem correlates with \_\_\_\_\_, according to Nathaniel Branden.
  - a) Willingness to admit mistakes
  - b) Inappropriate conformity
  - c) Rigidity
  - d) Rebelliousness
5. What is the correct cause and effect relationship?
  - a) Negative thoughts cause negative feelings which cause non-productive actions
  - b) Non-productive actions cause negative feelings which cause negative thoughts
  - c) Negative feelings cause negative thoughts which cause non-productive actions
  - d) Negative thoughts cause non-productive actions which cause negative feelings

Email Steffen Peuker, [speuker@calpoly.edu](mailto:speuker@calpoly.edu), for more information and access to iRAT/tRAT material for freshmen seminar course. Visit <http://www.teambasedlearning.org/> for more information on TBL.

Mott, J., Peuker, S., Achieving High Functioning Teams Using Team Based Learning in Flipped Classrooms, 122<sup>nd</sup> ASEE Annual Conference and Exposition, June 14-17, Seattle, Washington, USA, 2015

Mott, J., Peuker, S., Using Team-based Learning to Ensure Student Accountability and Engagement in Flipped Classrooms, June 14-17, Seattle, Washington, USA, 2015

Mott, J., Peuker, S., Implementing Team Based Learning in Freshmen Engineering Courses, Sixth Annual First Year Engineering Experience Conference (FYEE), College Station, TX, USA, August 7-8, 2014

## Minute Paper

Below is an example of a Minute Paper. The idea is to give students a minute (or two) at the end of a class session to fill out the form and hand it in. It can also double as attendance form, using the “circle your letter” helps to sort the papers for large class sizes.

**Date: 02/20/2015**

**Attendance Form – ME163**

Circle first letter of last name: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Circle second letter of last name: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Make sure you print your name and sign the form and turn it in at the end of the lecture.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

1. What was the most persuasive or convincing argument/idea in today’s lecture?

2. During today’s class, what idea(s) struck you as things you could or should put into practice?

## Resources to Support Instructors

A wealth of support material can be found under:

<http://discovery-press.com/discovery-press/studyengr/NewResource/0.asp>

1. **Project student assignment statements**
  - 1.1 **Project Statement (doc) (pdf)**
  - 1.2 **Alternative Project Statement – Shortened version (doc) (pdf)**
  - 1.3 **Alternative Project Statement – Extended version (doc) (pdf)**
2. **Impact of implementing the project at University of Alaska Anchorage and Oregon State University**
3. **List of colleges/universities that have implemented the project including contacts**
4. **Implementation Guide**
5. **Syllabi at colleges and universities implementing the project**
  - 5.1 **University of Alaska Anchorage**
  - 5.2 **Oregon State University**
  - 5.3 **East Carolina University**
  - 5.4 **Eastern Nazarene College**
  - 5.5 **Oregon Institute of Technology**
  - 5.6 **Calvin College**
6. **Sample student final project reports**
  - 6.1 **University of Alaska Anchorage (6 reports)**
  - 6.2 **Oregon State University (2 reports)**
  - 6.3 **Cañada College (3 reports)**
  - 6.4 **Oregon Institute of Technology (1 report)**
  - 6.5 **Boise State University (5 reports)**
7. **Material to support implementation of the project**
  - 7.1 **Syllabus (docx) (pdf)**
  - 7.2 **Assignments to guide students through each step of the project**
  - 7.3 **PowerPoint slides**
  - 7.4 **Project Report template**
  - 7.5 **Example Project Grading Rubric (docx) (pdf)**
8. **Assessment/research materials for measuring impact of project**
  - 8.1 **Joining the Research Effort – Information**
  - 8.2 **Matrix – Overview of data to be collected**
  - 8.3 **Example IRB Proposal - Enhancement of freshman engineering success (docx) (pdf)**
  - 8.4 **Consent Forms**
  - 8.5 **Surveys – MS Word Files**
  - 8.6 **Surveys – Qualtrics Files**
9. **Things “Implementers” can do to support the Design Your Process” movement**

## E-portfolio about implementation at Cal Poly:

<https://contentbuilder.merlot.org/toolkit/users/speuker/speuker>

### ENGR A151 - Semester Project Rubric – Spring 2013

Category	4	3	2	0
<b>Content</b>	All objectives as outlined on the project statement are addressed sufficiently	Three or less objectives are not addressed	Six or less objectives are not addressed	Less than six objectives are addressed and/or contains lengthy copied passages from sources
<b>Length</b>	Meets or exceeds the stated length requirement	1 page short	2 pages short	Less than 6 pages
<b>Fluency</b>	Each sentence is clear and has obvious emphasis. All sound natural when read aloud.	Some sentences are awkward or difficult to understand; almost all sound natural when read aloud	Several sentences are awkward or difficult to understand; most sound natural when read aloud.	Almost all sentences are awkward, repetitive, or difficult to understand
<b>Grammar and Spelling</b>	Less than 2 spelling or grammar mistakes per page	Less than 4 spelling or grammar mistakes per page	Less than 6 spelling or grammar mistakes per page	More than 6 spelling or grammar mistakes per page
<b>Formatting and Organization</b>	Adheres to all format requirements and has a clear organization, for example title page, headings for each objective etc.	Adheres mostly to all format requirements; misses title page or has other minor organizational deficits	Has major formatting issues and/or major organizational deficits	Does not adhere to format requirements and does not show any organization
<b>Citation</b>				Contains verbatim copied passages without proper citation or other forms of plagiarism -> <b>results in 0 score for report regardless of above scores</b>



**Report Template**

**University of Alaska Anchorage - School of Engineering**

**ENGR A151 - Introduction to Engineering - Spring 2013**

**My Process to Become a "World-Class" Engineering Student**

*by*

*Your Name*

Date of submission

Month/Day/Year

## Introduction

Describe the purpose of your report. Why are you writing the report (note that "it is required" should not be mentioned here, focus on what you want to get out of this report)? You should state in the introduction what your goal(s) are.

## Section Headings

Divide your report in several sections. The Introduction is a required section as well as the Summary section. There is no fixed number of sections between the Introduction and Summary section, but you can use the textbook chapter titles as guidelines. Note that the sections between the Introduction section and Summary section is where the majority (~80%) of your text should be placed. This is where you analyze in detail for each topic/objective what you need to do to move from where you are to where you want to be. You should use bulleted or numbered lists when appropriate, but do not overuse them. Consult the textbook for examples. In general, bulleted lists are useful for highlighting and separating out groups of important ideas whereas numbered lists are great for describing sequences of events or steps. For example,

- Only use one idea per bullet
- If rearranging the elements would cause the list to become confusing, a numbered list should be used
- Readers love lists, so don't be afraid to use them
- be wary of over-using bulleted lists, or you might make your paper read like a PowerPoint presentation

## Summary

Summarize the your analyze from the previous sections. Don't rewrite what you already wrote in previous sections, rather write a closing statement. The summary should be no longer than 2 pages.

## Appendix

An Appendix is not required. You can use an Appendix in case you want to show supportive material, for example a flow chart of your 4 year plan to graduation.

## References

Use proper citation for all your source and list them in this section, for example:

[1] Landis, Raymond B., "Studying Engineering: A Road Map to a Rewarding Career", 4th Edition, Discovery Press, Los Angeles, California, 2012

## **Peer Grading**

Besides being able to implement the "Design your Process for Becoming a "World-Class" Engineering Student" and handle the grading load in courses with high enrollment, having students grade each other's assignment has additional benefits for the students:

- Students reading other students assignments can have a powerful impact
- Students grade each other, not the instructor → project is about the students
- Students learn how to evaluate someone else's work
- Students get feedback from their peers

## **Calibrated Peer Review**

Visit: <http://cpr.molsci.ucla.edu/Home.aspx> for more information.

## **CrowdGrader**

Visit: [www.crowdgrader.org/](http://www.crowdgrader.org/) for more information

**Room for notes:**

## Appendix

### Student Feedback

Compiled feedback from the anonymous course evaluation surveys given at the end of each semester, Fall 2012 and Spring 2013, ENGR A151 Introduction to Engineering, University of Alaska Anchorage.

#### What was the highlight of this course for you?

I think a course like this should be required of all first year and transfer students. In fact, if anyone currently attending college has not had this course or one very similar to it, they should be required to take it. There is a ton of useful information on the learning process.

I really enjoyed being able to create my project and road plan to graduating. It made me think about things that I need to do and prepare for.

Learning how to be productive and understanding how demanding studying engineering is.

Interacting and talking with other students that are studying engineering.

I enjoyed learning how to become a successful student, thus, becoming a successful engineer in the future.

The huge project at the end. I learned a lot about myself.

Learning what behaviors I need to change.

This course allowed me to learn more about myself. The concepts of this course should be the first requirement of any college freshmen.

Learning how to deal with distractions and negative behaviors and attitudes.

I enjoyed how this course made me think about and develop what I need to do to graduate with the degree I am going for.

The highlight of this course for me was actually learning about the different fields of engineering and then deciding which one I want to pursue, where all my goals were set for during my education as well as after my education. This really gave me a clear path of my future so that I may follow it with no doubts or insecurities and achieve my goals in the most effective way possible.

Deciding Engineering is going to be my major because of this course.

The highlight of this course for me was learning about myself because the course gave me the perfect opportunity to realize my flaws and what I need to change.

I enjoyed the entire course – it was nice to take a step back from the technical side of things and really focus on student success skills

**ENGR A151 is taught as a student success orientated course, i.e. what it takes to be successful in studying engineering. Would you recommend to keep this as the main focus of the course? Why or why not?**

Yes – I think that it is an excellent course – one that had I taken my first freshman year could have drastically changed the outcome of my first college experience

This class should be required for ALL students entering their freshman year at University. It is very empowering and makes us focus on the career path we are striving toward -- the goal of graduating with a degree in a specific field of study.

I would definitely recommend it. We are all responsible for our own success, and learning how to create that success is valuable.

This class opens your eyes to the possibility of achieving a degree in Engineering and how to get there. I believe that a lot of students need this class to push them towards the right direction.

I would highly recommend this course to remain as a student success orientated course as the main focus. I feel so much more prepared to tackle my engineering degree after taking this course. The principles taught were extremely beneficial and promote further learning as the years progress.

Yes, I definitely feel it gives incoming freshmen the tools and enlightenment they need to become successful students.

Yes. Undoubtedly, this course has improved my ability to learn, study, and set goals. I am very thankful for ENGR A151.

Absolutely, I think I learned a lot about being a college student that I otherwise would not have learned.

Yes because it tells you how you can be successful in engineering.

Yes, because there are no other courses like this. This was very beneficial and I wouldn't have learned some very basic skills without this course.

Yes, it was really motivational and reinforced my goal of becoming an engineer.

Yes, I would recommend this as the main focus in the course. It makes students aware of what to expect, and what needs to be done in order to be successful in their studies.

Yes. Before this course I wasn't even sure that I wanted to be in the field of engineering, but by the end of the course I had chosen a major and set major goals in my life. It definitely helped me get a clear view of my path ahead and what I can accomplish if I just set my mind to it.

I would definitely recommend to keep this course as the main focus. It teaches freshman engineering students about what they are getting themselves into and how they can be successful in their courses in the most effective way possible.

Absolutely. If that message gets across then it will help the students in their academic career more than anything else that could be taught in a 1 credit class.

I think it's a great idea to keep the course. It's made me change some habits that I've had and discover some personal weaknesses that have been undiscovered for a long time.

**Will the material presented in this course help you in staying on track to graduate with an engineering degree?**

I believe it will. I feel much more motivated and confident about my ability to complete my degree than before taking this class.

Absolutely. The Material covered is exactly what I needed to understand in order to stay on track.

Most definitely. Honestly, I feel more prepared going into the rest of my undergrad coursework because of this class. I also feel like I have been provided more information to ensure my academic success.

It definitely helped with my organization and planning and setting goals.

Yes, the final project definitely helped me plan out for my future and I can refer back to it later to keep track of how I'm progressing.

Yes, many of the things recommended in the course to help people focus and succeed while studying engineering I have not thought of.

Yes, it has helped me develop a system for studying and doing homework.

Yes, I feel that it has helped strengthen my resolve on my path as an engineer.

There were several assignments that will certainly be beneficial to me as a student - like the Semester Project. It is likely that I would not have made time for these beneficial activities if they had not been assigned.

I wrote my final paper for the class in all honesty and I plan to use a lot of what I wrote to keep me on task.

I believe it will, as I am more aware of what is holding me back.

I believe this course would be a great course for anyone to take, regardless of whether or not they are in the engineering department. I learned so much about myself and it really helped me decide if what I am doing is what is right for me.

**Comments: Use the space provided in the text area below for your comments.**

Each degree program should consider using this class as a model to require their students to take. It is invaluable. I cannot express this anymore emphatically.

This course really taught me how to become a more successful student.

I wasn't a fan of all the writing but I think it still helped me learn.

This course is a keeper! I would like to take this survey again in 3 years when I graduate and I bet I still rate this course as one of the best!

So glad that your classes are covering all these things that we need to learn and understand. I think this class should be required for every entering student who comes to UAA. Seriously. I've learned more about UAA through this class than ever before.

I really enjoyed your class and I am glad that I have taken this class because I have learned a lot and I now know what it takes to become a "world-class" engineering student and engineer.

Thank you for providing the opportunity for a student like me to be a part of your class. It was truly an eye-opening experience.

## Publications



Paper ID #11270

### **Improving Student Success and Retention Rates in Engineering: An Innovative Approach for First-Year Courses**

Peuker, S., Schauss, N.A.G., Improving Student Success and Retention Rates in Engineering: An Innovative Approach for First-year Courses, 122<sup>nd</sup> ASEE Annual Conference and Exposition, June 14-17, Seattle, Washington, USA, 2015

<https://www.asee.org/public/conferences/56/papers/11270/view>

**Sixth Annual (FYEE)  
First Year Engineering Experience Conference  
*Enhancing the First Year of Engineering Education*  
College Station, TX; August 7 - 8, 2014**

**Session T4A**

### **Improving Student Success and Retention Rates in Engineering: One Year after Implementation**

Peuker, S., Schauss, N.A.G., Improving Student Success and Retention Rates in Engineering: One Year after Implementation, Sixth Annual First Year Engineering Experience Conference (FYEE), College Station, TX, USA, August 7-8, 2014

<http://fyee.org/fyee2014/papers/1011.pdf>