Essay

I never expected to discover that baguettes were the best utensils for eating noodles. The Carol of the Bells would be silent without a baguette. When I learned that in French a "baguette" is not only a piece of bread, but also a chopstick and a conductor's wand, I became enamored with the French language and culture. I entered French 1 thinking I was sitting in a classroom, but four years later I left AP French knowing I had begun to dive into a new cosmos.

Another misconception I held as I entered French was that language and mathematics were disparate. Little did I know that the word for ninety-seven in French literally translates to convoluted arithmetic: four times twenty plus ten plus seven. Language parallels math because grammar is an open-ended formula through which to craft the art of language. I love having to question which verb tense I'm using in every situation I write about. I have to ask myself if an action occurred in the past, as background information in the past, or in the past before the main event in the past occurred; each scenario demands a different conjugation. An intense passion for grammar may seem odd, but I feel incredibly blessed that my high school French teacher still posts French grammar jokes on my facebook wall.

Learning French as a foreign language provided me with a unique sense of community. I had always been motivated by growth rather than fear of embarrassment, so I relentlessly asked questions and spoke French with my classmates even outside of class. These were the same classmates with which I enjoyed eight varieties of cheese at French club, got into snowball fights at the French immersion camp at Big Bear, and sang La Vie en Rose. As a French Club officer and member of the French National Honors Society, I encouraged members to dance to French songs during cheese parties and photographed them individually in order to get to know them more personally.

I am confident that at École Polytechnique I will find an even more vibrant and fitting community, one that is novel but familiar at the same time. I am excited to cook with people from all over the world and bring my competitive sportsmanship to the tennis club. I have been a competitive tennis player for 12 years, and played number 1 singles for Caltech's women's' tennis team. I was the MVP of my high school varsity team and captained the team to our first CIF Southern California Championship. Tennis has become an integral part of my identity as it has taught me resilience and strength. No other sport means nearly as much to me, so it would be a blessing to be able to compete with international players at École Polytechnique.

I look forward to participating in many traditions and clubs at École, but there is definitely much more to student life than classroom or on-campus activities. Personally, I know my perception of France truly came to life in 2016 when my French teacher hosted a field trip to Paris and Lyon and encouraged us to speak only French. The trip was both educational and exploratory. The first week, we stayed with host families in Lyon and had the opportunity to attend high school with them. I remember sitting in the physics classroom, amazed that I understood the entire lecture, but ashamed that I couldn't conceal my laughter when a French student answered that the force of gravity points up. That whole week, I spoke only French, except when my host's brother wanted to practice some English. I completely immersed myself in the French culture, falling in love with simple intricacies from French chocolate cereal to the jarringly nonexistent gap between our taxi and the car in front of it. On our first day in Paris, we climbed the Arc de Triomphe and the Eiffel Tower by foot before walking a few thousand more steps to devour some fries on the front steps of a BNP Paribas building, all fifteen of us in a row since the streets were too cramped to seat all of us. I know that at École Polytechnique, I will create more memories that I will hold onto forever.

At École, I can take courses in environmental science that reflect the astrobiology branch of my planetary science option here at Caltech. I want to fully experience the education system in France, as I know from my high school visit that the emphasis on classwork over homework suits me well. I always admired the independence and maturity of French students compared to Americans in their age group. I hope to learn from their autonomy while sharing my experience growing up an hour away from the beach and Hollywood Blvd. It is my dream to study science while fully immersing myself in the French language and Culture, and the exchange program at École Polytechnique provides the perfect opportunity.

Program Fit

The program at École Polytechnique is a perfect fit for me academically. As shown in my degree audit, the Planetary Science requirements I plan to complete abroad are satisfied through the Environmental Science multidisciplinary concentration at École Polytechnique. In my proposed courses for the program, I will complete all of my remaining advanced science requirements, and once GPS elective requirement. If my tentative courses must be revised, the concentration I chose covers a span of departments (for GPS majors, advanced science flexibly includes math, physics, engineering, chemistry and biology), so it will be easy to make adjustments to maintain that all the courses I take abroad satisfy degree requirements. École is my top choice because it allows me to explore my two lifelong passions of French and Science, providing me an enriching culture and bilingual environment.

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Je n'avais jamais prévu que les baguettes étaient les meilleurs ustensiles pour manger des nouilles. Les chants de Noel seraient silencieux sans une baguette. Quand j'ai appris qu'en français, une baguette n'est pas seulement un genre de pain, mais aussi "a chopstick" et "a conductor's wand," je suis devenue amoureux de la langue et la culture françaises. Je suis entrée le premier niveau de français en pensant que je m'assoyais dans une salle de classe typique, mais quatre ans plus tard J'ai quitté Français AP sachant que j'avais commencé à me plonger dans un nouveau cosmos.

Une autre idée fausse que je croyais quand j'ai commencé à suivre le Francais etait que les langues et les mathématiques étaient disparates. Mais je ne savais pas que le numéro 97 en Francaise se traduisait bizarrement en arithmétique tordu: quatre-vingt dix-sept (20 x 4 + 10 + 7). La linguistique ressemble aux mathématiques car la grammaire est une formule ouverte qui sert à construire des phrases. J'aime cogiter pour choisir entre les temps du passé: le passé composé, l'imparfait, et le plusque parfait; chaque scénario demande une conjugaison différente. Ma passion intense pour la grammaire peut sembler un peu bizarre, mais je suis reconnaissante que mon enseignante de français au lycée poste toujours des blagues de grammaire sur mon mur Facebook.

En apprenant le Français, j'ai gagné aussi une communauté spéciale. Puisque la croissance me motive toujours plus que la peur, Je posais des questions sans cesse et je parlais français avec mes amis même en dehors du cours. Ils étaient les mêmes camarades de classe avec lesquels j'avais goûté huit genres du fromage au Cercle Français, fait la bataille de boules de neige à la camp française, et chanté La vie en Rose. Comme j'étais une directrice du Cercle Français, j'ai encouragé les membres à danser sur la musique Française, et je leur ai pris des photos individuels.

Je suis certaine que quand j'irai à l'École Polytechnique, je decouvrai une communauté encore plus vivant et approprié qui est au même temps étrangère et familière. J'ai hâte de cuisiner avec des étudiants du monde entier, et d'affronter des autres équipes de tennis. Comme je suis une joueuse de tennis depuis douze ans, j'ai vraiment l'esprit de compétition, et j'étais au poste #1 dans l'équipe de Caltech. J'étais la "MVP" de mon équipe de lycée et j'ai mené mon équipe à notre premier CIF Southern California championnat dans toute l'histoire de l'école. Le tennis est un élément très essentiel de mon identité; il m'a rendue résistante et forte. Il n'y a pas d'autre sport si important pour moi, donc je voudrais bien faire du tennis à l'École Polytechnique.

Bien que j'aie hâte de participer aux événements à l'École, je sais qu'il y a sans doute plus à faire au dehors du campus. Pour moi, ma perception de la France s'est vraiment animée il y a trois ans quand ma professeure de lycée a organisé un voyage à Paris et à Lyon où nous ne pouvions parler qu'en Français. Le voyage étaient à la fois éducatif et palpitant. La première semaine, nous habitions avec des familles d'accueil et nous allions au lycée avec eux. Je me souviens du cours de physique, car j'ai compris toute la leçon, mais je ne pouvais pas m'empêcher de rire quand un élève a dit que la force de gravité était dirigée vers le haut. Toute la semaine, je parlais seulement le français, sauf quand le frére de la famille voulait pratiquer l'anglais. Je m'immergeais dans la culture Française et je suis tombée en amour des subtilités comme des céréales au chocolat françaises et la proximité des voitures dans la rue. Le premier jour à Paris, nous sommes monté à pied l'Arc de Triomphe et la Tour Eiffel avant de marcher des milliers de steps de plus pour dévorer des frites devant le bâtiment BNP Paribas. Nous sommes quinze, tout en rang parce que les tables dans les rues étaient trop petites pour nous. Je sais que à L'École Polytechnique, je ferai plus de souvenirs que je tiendrai toute ma vie.

À l'École, je peux suivre des cours de science de l'environnement, qui satisfont les besoins de la planétologie à Caltech. Je veux complètement profiter de l'éducation Française, parce que je sais que l'accent sur le travail de classe est bon pour moi. J'admire l'indépendance et la maturité des étudiants français par rapport aux Américains. J'espére imiter cette autonomie en partageant les expériences de ma vie en Californie. Je rêve toujours d'étudier les sciences en me plongeant dans la langue et la culture françaises. La programme d'échange à L'École Polytechnique est donc parfaite pour moi.

Course Name	Biodiversity and Functions of Ecosystems
Course Number	BIO555
Level	Ingénieur 3A
Department	Biology
Number of ECTS Units	4
Caltech Units	9
Caltech Credit Sought	Option Credit (Adv. Science)
Caltech Evaluator	Rob Phillips
Course Description	Ecology, the science of interactions between organisms and their environment, is the most relevant discipline to analyze the relationships between Humans and Nature, i.e. to understand how human societies and the rest of the biosphere influence each other. This course focuses on the concept of Biodiversity - the diversity of living organisms and their interactions - and examines the functioning of ecological systems, from populations to ecosystems. The general aim of the course is to provide scientific tools to understand and solve ecological problems, such as the effects of global change on biodiversity, the impact of biofuel expansion on hydrological cycles, the consequences of species loss on human health, etc. Interdisciplinary approaches are crucial to understand the joint dynamics of biodiversity, human societies and the physical environment. Emphasis will be placed on the notion of ecosystem service (natural processes that sustain and fulfill human life): this concept lies at the interface between ecology, economics and social sciences and makes it possible to analyze how human societies depend on biodiversity and to discuss the sustainability of environmental systems. Requirements : No prerequisite Teaching coordinator: Catherine Morais Teaching coordinator: Emmanuelle Porcher

Course Name	Terre Solide et Environment
Course Number	PHY 550
Level	Ingénieur 3A
Department	Physics
Number of ECTS Units	5
Caltech Units	10
Caltech Credit Sought	Option Credit (GPS Elective)
Caltech Evaluator	Bethany Ehlmann
Course Description	Le but de ce cours est d'offrir une vue globale de l'évolution de la Terre depuis sa formation et celle du système solaire, son évolution précoce il y a 4 milliards d'années jusqu'à son évolution plus récente dont les grandes extinctions ou les changements environnementaux sont quelques-uns des signes les plus emblématiques. Pour avoir du recul par rapport à tous ces changements il faut pouvoir, par exemple, reconstituer les changements climatiques qu'a connus la Terre au cours de son histoire géologique, comprendre les liens qui existent entre les processus géodynamiques et la composition de l'atmosphère à travers notamment les réactions d'altération chimique, mais aussi avoir des idées sur l'évolution climatique de Mars et donc en partie sur les processus qui font qu'une planète peut acquérir et conserver une atmosphère et une hydrosphère. L'évolution de la Terre doit être mise en perspective de l'évolution planétaire en général. De même, il semble difficile d'avoir une vision claire des questions de pollution des sols et des nappes d'eaux souterraines et des manières d'y remédier ou des questions de stockage de déchets sans connaître ce qu'est un gisement métallifère (ou de pétrole) et les processus géologiques qui ont fait ce gisement. L'histoire de l'origine et de l'évolution de la Terre est enregistrée dans les compositions minéralogiques, chimiques et isotopiques des roches terrestres et extra-terrestres et toute la difficulté est dans la "lecture" de cette histoire pour arriver à une compréhension et à une modélisation physico-chimique des processus. Ce domaine de recherches a connu des avancées spectaculaires ces dernières années grâce au développement de nouvelles techniques d'analyse donnant accès à des échelles d'étude, que ce soit en résolution spatiale ou en précision, jusqu'à présent hors d'atteinte.

	Ce cours présente l'état actuel des recherches et des connaissances sur la formation et l'évolution de la Terre en partant de l'observation des roches terrestres et des météorites et en montrant comment et avec quel degré de confiance les processus physiques et chimiques mis en jeu sont quantifiés. Les petites classes associées au cours permettront à travers de nombreux exemples de faire ce chemin allant de l'observation, et de l'analyse à la modélisation des processus. Des projets plus spécifiques de travail personnel ou une sortie géologique pourraient être organisés pour les élèves le souhaitant. Langue du cours : Français

Course Name	Genomes, Diversity, Environment and Human Health
Course Number	BIO556
Level	Ingénieur 3A
Department	Biology
Number of ECTS Units	4
Caltech Units	9
Caltech Credit Sought	Option Credit (Adv. Science)
Caltech Evaluator	Bruce Hay
Course Description	Over the past decade, by drastically reducing the cost of DNA sequencing and synthesis, engineering science has revolutionized biological research. During this period, we observed an explosion in the number of sequenced genomes and applications resulting from DNA sequencing and manipulation. The aim of this course is to give an overview of this "genomic revolution" and how it has radically changed biomedical research in recent years. The diversity of the organization of genomes, the structuring of microbial communities in their natural environment such as the earth or the human intestine and their consequences on the ecosystem and human health, the discovery of new genes and functions, Human genetics and the history of human populations, or the identification of genetic factors involved in human diseases and cancers will be presented. We will detail the different tools and models used to integrate this massive amount of information for the basic sciences as well as for applied purposes. Throughout the course, we will present concrete examples of applications ranging from the design of a new generation of biofuels to bio-remediation or medical diagnosis and treatment of diseases. The main chapters will be: • Historical aspects and tools for DNA sequencing and manipulation; • Genomic, fundamental and applied facets of human and environmental microbiome studies • Integration of genomic data at the functional level and synthetic biology; • Study of bacterial genomes, evolution of genes and phylogeny;

	• Study of eukaryotic genomes and genomic conflicts; • Population genomics, coalescence, human evolution and domestication; • Genomics of human genetic diseases and cancer; • Expression, regulation, small RNA and principles of systems biology; • Genomics in the laboratory, from cell biology to evolution. Ethics and genomics; We will deal with a variety of issues to which genomics brings a new perspective: • Is there a human gene? • Do the microbes in our digestive tract dictate our behavior? • How emerged organismal complexity? • What are the genetic determinants of cancer? • What future for biofuels and synthetic biology? • What is the use of non-coding DNA? • Is the resurrection of missing organisms, such as mammoths or dinosaurs, possible with current technologies? • What are the risks of genomics and synthetic biology? • Why introns in our genes?

Course Name	Energy and Environment
Course Number	PHY 555
Level	Ingénieur 3A
Department	Physics
Number of ECTS Units	4
Caltech Units	9
Caltech Credit Sought	Option Credit (Adv. Science)
Caltech Evaluator	Evan Kirby
Course Description	Bilingual Course The general topic of energy, both at French and worldwide levels, represents some considerable challenge in this beginning of the twenty-first century. We should take up in the next few years a significant number of challenges including the depletion of fossil resources or the consequences of global warming. Understanding concepts related to energy, its most fundamental aspects in its various forms and many uses, becomes essential in the formation of an engineer. The impact on the environment, climate change, the reasonable use of fossil fuels and alternative solutions must be at the heart of its concerns. This course is largely a about physics and applications. However, it introduces and develops numerous multidisciplinary concepts related to energy such as economy or environment. It will represent an introductory course for students who are considering to study in Masters for careers related to the problems of energy and sustainable development. It will give to other students some comprehensive and rigorous overview of problems, essential to understand our society and its issues. The course consists of approximately three parts 1. The energy and its use Historical context and definitions. First and second principles. Orders of magnitude and fundamental interactions. The different forms of energy. Primary and secondary Energy. Efficiencies.

	Resource depletions. The peak oil discoveries. The French and worldwide context. The climatic consequences. The mechanism of the greenhouse effect. CO2 emissions and international agreements. 2. Renewable energy Different solutions: hydro power, wind power, solar, biomass and others. Comparison of different type of primary energy in the production of electricity. Hydrogen as energy vector for the future. The general problem of transport. The technical, environmental and economic issues. The recent improvement for the use of fossil fuels. CO2 storage and other research topics. 3. Nuclear Energy Principle of current reactors. The future generation 4. The fuel cycle and resource depletion. Problems and solution of waste storage. The prospects of fusion for the production of electricity The Tchernobyl, Fukushima and Three Mile Island accidents.

Course Name	Français Langue Étrangère
Course Number	Dependent on Tested Level
Level	Ingénieur 3A
Department	Languages and Cultures
Number of ECTS Units	2
Caltech Units	-
Course Description	This is a required course for Caltech Students Studying Abroad

Total ECTS: 17
Total CIT Units: 37
Course by Correspondence Units: 0