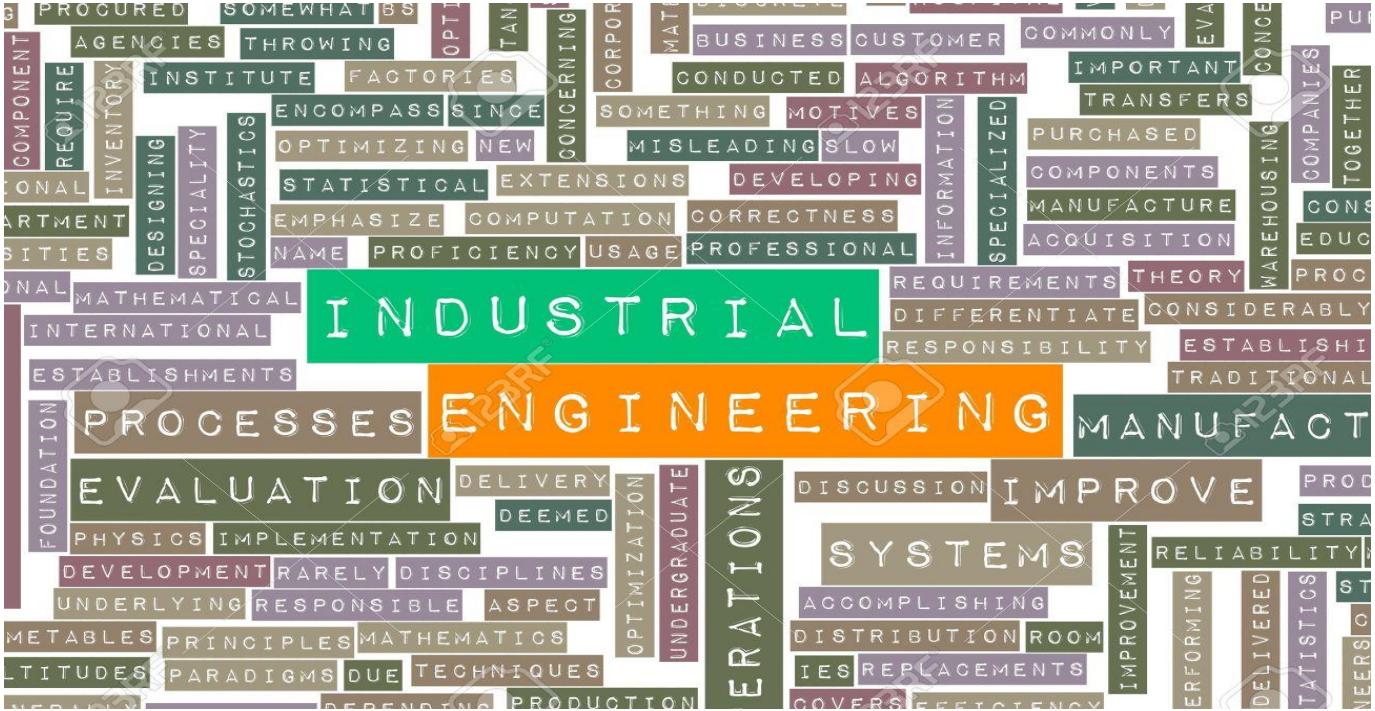
Industrial Engineering and Management Orientation 2024



Industrial Engineering and Management Department Office

Chairperson

- **Prof. Bacel Maddah**
- Ext. 3551
- bm05@aub.edu.lb

Executive Assistant

- **Ms. Maya Kouzi**
- Ext. 3407
- mk109@aub.edu.lb

Full-Time IEM Faculty Members

Name	Rank	PhD, University, and Year	Field of Expertise
Bacel Maddah	Professor and Chair	Industrial Engineering, Virginia Tech, 2005	Retail & Supply Chain Mgt., Financial Engineering
Maher Nouiehed	Assistant Prof.	PhD in Industrial Engineering, University of Southern California, 2019	Large-Scale Optimization, Data Analytics
Moueen Salameh	Professor	Industrial Engineering, Virginia Tech, 1978	Inventory Control, Production and Scheduling
Hussein Tarhini	Assistant Prof.	Industrial Engineering, Virginia Tech, 2014	Supply Chain Mgt. & Humanitarian Logistics
Majd Olleik	Assistant Prof.	PhD in Electrical Engineering - Energy Economics, Technical University of Vienna	Energy Transition, Applied Optimization, Decision Analysis
Karim Zahed	Assistant Prof.	PhD in Industrial & Systems Engineering, Texas A&M University, 2022	Human Factors Engineering, User-centered design
Hisham Abou Ibrahim	Assistant Prof.	Ph.D. Civil Engineering, AUB, 2019	Project Management, Digital Twins
Nabil Nehme	Visiting Assistant Professor	Transportation Systems, AUB, 2013	Supply Chain Management, Port Operations, Sustainable Infrastructure

What is Industrial Engineering?

- Transformed from being highly manufacturing-focused to having greater service-sector focus.
- Concerned with the design, improvement, and installation of ***integrated systems*** of people, equipment, materials, information, and energy.
- Utilize specialized concepts of mathematical, physical and social sciences to predict, analyze, and evaluate an ***integrated system***.

Institute of Industrial Engineers

More Simply ...

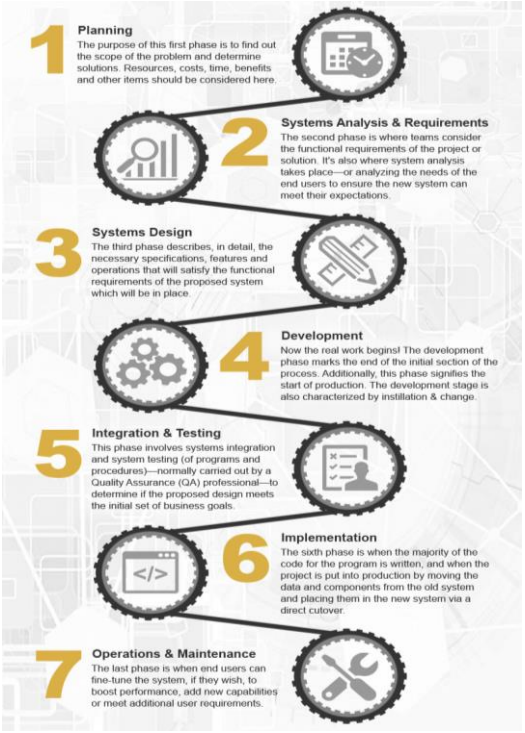
What is Industrial Engineering?

- Typical systems industrial engineers design and analyze:
  - Manufacturing Systems
  - Supply Chain Networks
  - Service Systems

- Optimize the system for optimal efficiency, effectiveness, throughput, accuracy, safety, profit, or some other objective of interest.

Steps Involved in Optimizing/Analyzing a System

- Understand the system requirements
- Collect and clean data
- Build a model
- Analyze/optimize the model
- Verify the results
- Implement/Adjust the system
- Operate and maintain



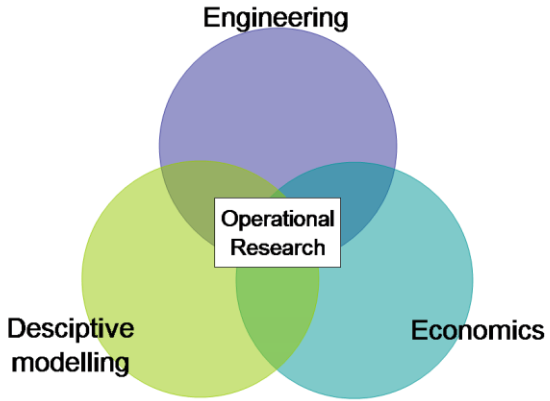
https://www.youtube.com/watch?v=Ww9hDlwjeF4

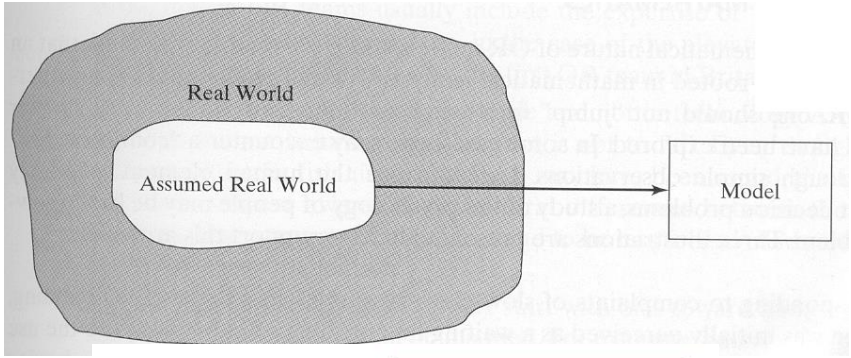
Examples of IE Focus Areas

- Operations Research
- Project Management
- Economic Feasibility
- Financial Engineering
- Manufacturing & Production Systems
- Ergonomics & Human Factors Engineering
- Quality Control & Engineering
- Supply Chain Management
- Product / Service Design & Development
- Retail & Revenue Management

Operations Research

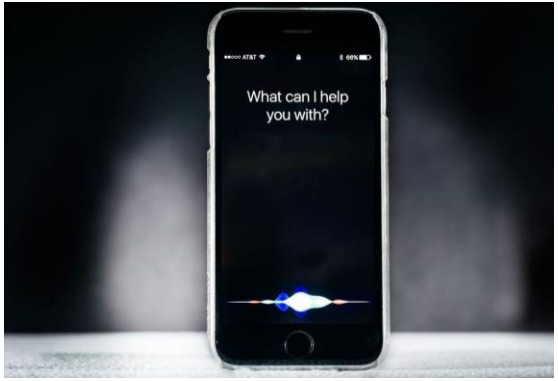
- Operations research (OR) combines the use of optimization, probability and statistics to solve problems in domains such as business, energy systems, health services, financial services, telecommunications and transportation.

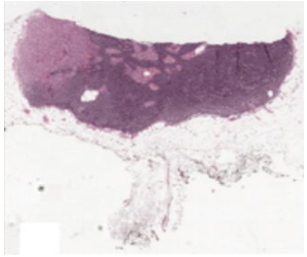




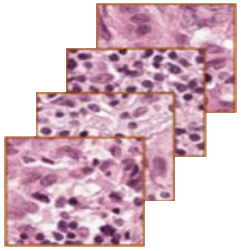
$$\max_{\vec{x}} f(\vec{x})$$
$$\text{s.t. } \vec{x} \geq 0$$

Applications of Operations Research

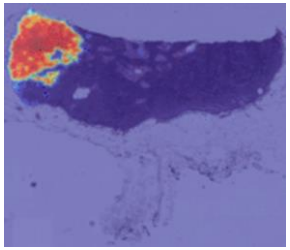




Whole Slide Image



Overlapping Image Patches



Tumor Probability Map

Project Management

- A project is a "temporary" endeavor undertaken to create a "unique" product or service.
- Project Management involves delivering the project, on time, on budget, and in good quality.
- That is, within the golden triangle.

Economic Feasibility Studies

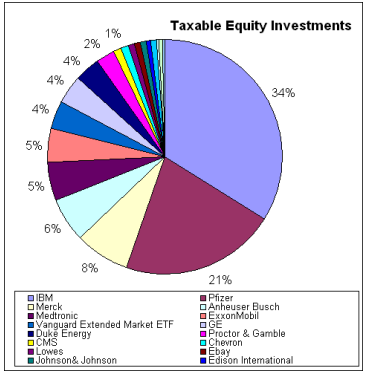
- It involves formulating and evaluating the financial outcomes of alternatives in engineering and business.

- It is a collection of mathematical techniques that simplify economic comparison.

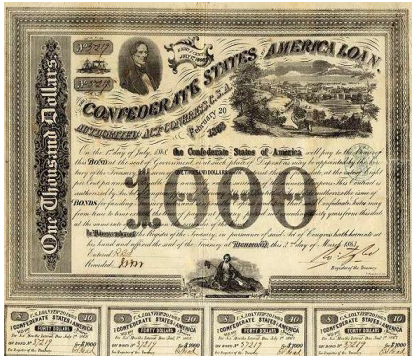
Financial Engineering

- Designing financial products to speculate (bet on) and hedge (protect from) risk.
- Students learn risk management along the way.

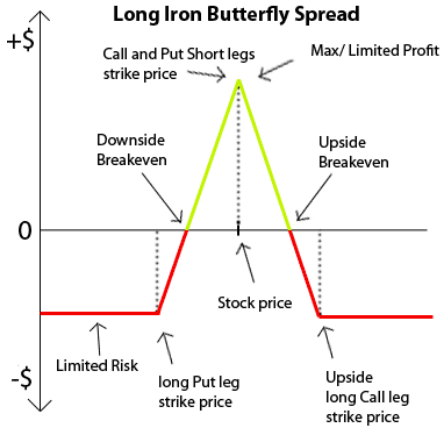
Equity (stock) portfolio management



Fixed–income (bond) Portfolio structuring

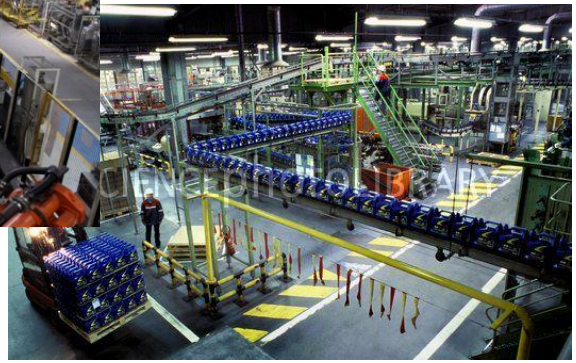


Financial derivatives pricing and hedging



Manufacturing and Production Systems

- Designing manufacturing lines and selecting manufacturing processes.



Ergonomics & Human Factors Engineering

- Study how people think, move and respond to input in order to design systems that work well.

• *Ergonomics* is the study of people physical capabilities

• *Human Factors* emphasizes mental capabilities

• *Human-Systems Design* is the study of how people interact with mechanical and computer systems.

Quality Control and Engineering

- Use statistical sampling to analyze and measure the quality of the products.

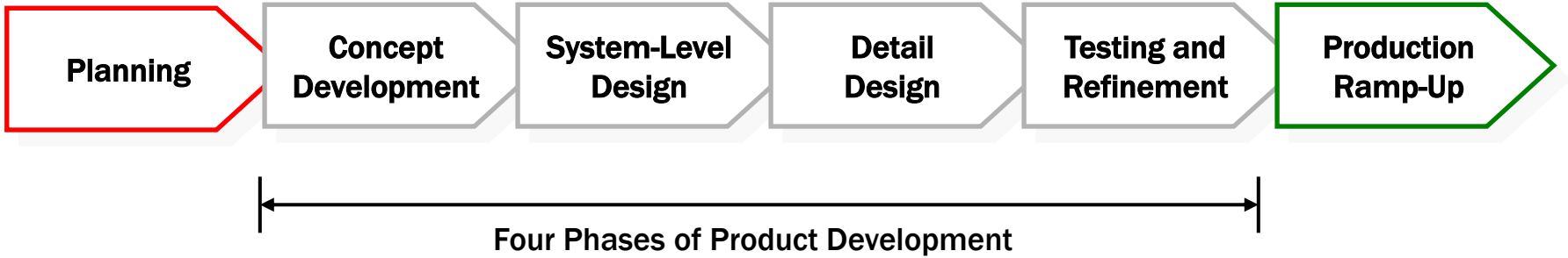
- Test new products and determine whether those products meet the standards of the business in reliability, durability and functionality.

Supply Chain Design and Management

- Get the right product to the right customer at the right time and price.

- It involves transportation, warehousing and inventory management.

Product Development

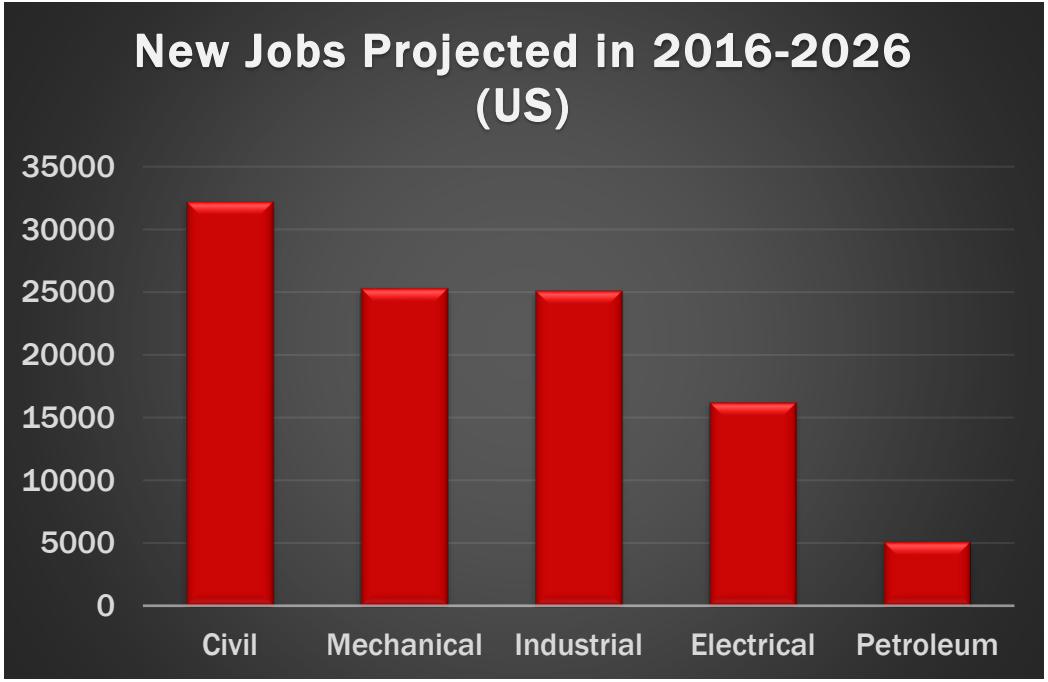


Retail and Revenue Management

- Match supply and demand in airlines and other service industries to maximize revenue from a fixed capacity.

- Help retailer in critical decisions such as assortment, pricing, shelf inventory, and allocations.

IE Job Market in the US



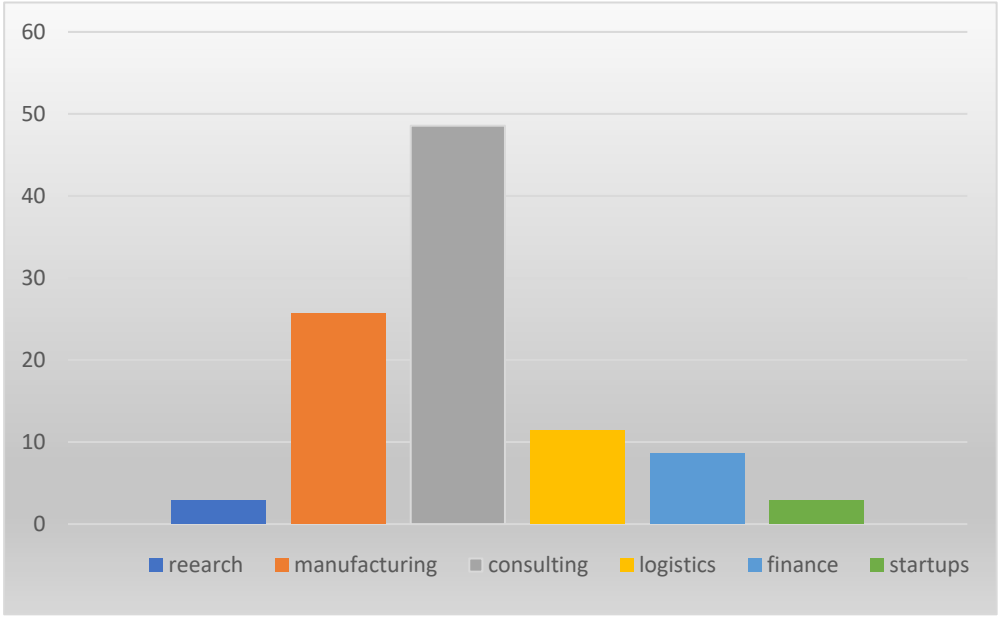
- Demand for IE jobs is expected to significantly increase.

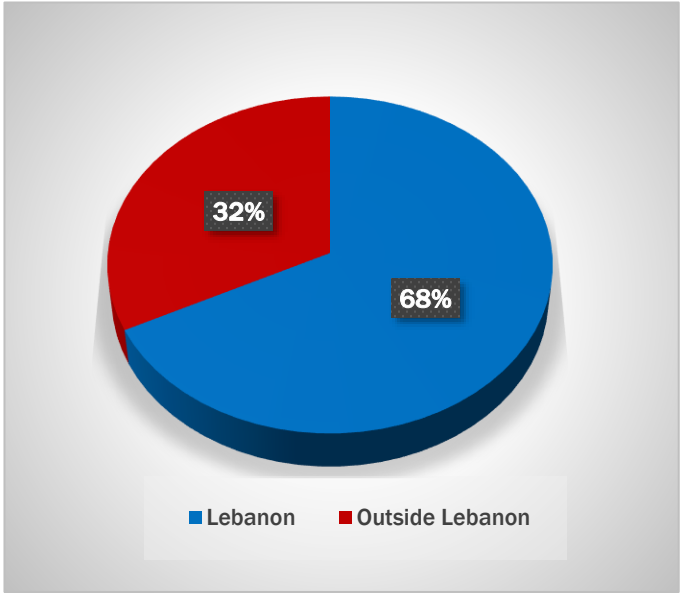
Source: US Bureau of Labor Statistics

Typical IE Jobs in Various Industries

- **Manufacturing**
  - Project management
  - Scheduling
  - Inventory management & Control
  - Supply chain management
  - Facility layout and location
  - Many more
- **Services**
  - Call centers design and management
  - Transportation and logistics
  - Retail management
  - E-commerce
  - Many more
- **Finance**
  - Wealth management
  - Private equity
  - Risk analysis
- **Healthcare**
  - Scheduling
  - Staffing
  - Process improvement
  - Biotechnology
- **Airlines**
  - Pricing and revenue management
  - Supply chain management
- **Military**

2022 IE Internship Experience





IE Curriculum

- Basic Science Courses: MATH 201, MATH 202, MATH 218/219, MATH 251, STAT 230, PHYS 210, PHYS 210L, CHEM 201/202, CHEM 203, BIOL 210.
- Basic Business Courses: MNGT 215, ACCT 210, MKTG 210.
- Engineering Fundamentals: CIVE 210, MECH 220, MECH 230, EECE 210, EECE 230, MECH 421.
- General Education Requirements.
- Total 143 credits: https://www.aub.edu.lb/registrar/Documents/catalogue/undergraduate21-22/iem.pdf

General Education Requirements

- English requirements: ENGL 203 and ENGL 206 (6 credits).
- Humanities: 12 credits including INDE 410 (3 credits from Humanities I and 6 credits from Humanities I and Humanities II (https://www.aub.edu.lb/units/general-education/Pages/GERequirements.aspx).
- Social Sciences: 6 credits including ECON 211.
- Arabic Communication Skills (3 credits).
- One Arabic course unless exempted from Arabic.
- If exempted, the student needs to take one 3-credit course in Social Sciences, Humanities or any language course including Arabic as a foreign language.
- No more placement test, the student has to choose from the GE Arabic Communication Skills Courses placed on GE program website

English Proficiency

- Students must demonstrate a level of English proficiency

http://www.aub.edu.lb/admissions/english/Pages/EnglishRequirements.aspx

English Course Placement	NEW SATI (After Jan 2016)	DUOLINGO English Test	TOEFL iBT	IELTS (Academic)	AUB EN
Exam Validity	***2years***		***2years***	***2years***	**1 year**
Intensive English 100A	Please refer below to *Important Notes	<100 & assessment by CSP	52-57	5.5 & assessment by CSP	25-27
Intensive English 100B	Please refer below to *Important Notes	<100 & assessment by CSP	58-68	5.5 & assessment by CSP	28-31
English 102	English >=530 One Essay<4	>100 & Writing Placement Test	*69-78*	6.0	32-39
English 203	English >=530 Each Essay >=4	>100 & Writing Placement Test	>=79	>=6.5 and all components >=6	>=40

- NEW SAT1 English score < 530, need to take AUB EEE or TOEFL exam.
- NEW SAT1 English score > 530 but no Essay taken, need to take an AUB Writing Test.
- (TOEFL iBT >79 or IELTS >=6.5 or AUB-EN >=40) with SAT Essay <4, need to take English 102.

Passing Grade

- To be considered full-time a student must carry a minimum load of 12 credits per semester (during Fall and spring).
- The minimum passing grade for courses is D.
- A student may repeat any course for which a grade of less than C+ was obtained.
- Students who want to repeat a course for which a grade of C+ or more was obtained should fill a petition.
- No course may be registered more than three times.
- When a course is repeated, the highest grade is considered in the calculation of the cumulative average. All course grades will remain a part of a student's permanent record.

Academic Probation

- A student is placed on academic probation if the student's overall GPA is less than 2.0 at the end of the second regular term, if the term GPA is less than 2.1 at the end of the third or fourth regular term, or if the term GPA is less than 2.2 in any subsequent term, excluding the summer term.

- Probation should be removed within two regular semesters, excluding summer, after the student is placed on probation, or when the student completes his/her graduation requirements.

- A student will be dismissed from the faculty if the student fails to clear academic probation within two regular semesters.

Thank you